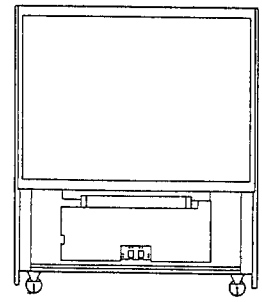
Service Manual

PIONEER®
The Art of Entertainment



ORDER NO.
ARP2945

PROJECTION MONITOR

SD-V5070NE

THIS MANUAL IS APPLICABLE TO THE FOLLOWING MODEL(S) AND TYPE(S).

Type	Model	Power Requirement	Remarks
	SD-V5070NE		
MYVZ	○	AC220V-230V	———

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This service manual is intended for qualified service technicians; it is not meant for the casual do-it-yourselfer. Qualified technicians have the necessary test equipment and tools, and have been trained to properly and safely repair complex products such as those covered by this manual.
Improperly performed repairs can adversely affect the safety and reliability of the product and may void the warranty. If you are not qualified to perform the repair of this product properly and safely, you should not risk trying to do so and refer the repair to a qualified service technician.

WARNING
Lead in solder used in this product is listed by the California Health and Welfare agency as a known reproductive toxicant which may cause birth defects or other reproductive harm (California Health & Safety Code, Section 25249.5).
When servicing or handling circuit boards and other components which contain lead in solder, avoid unprotected skin contact with the solder. Also, when soldering do not inhale any smoke or fumes produced.

NOTES
(FOR CANADIAN MODEL ONLY)
Fuse symbols (fast operating fuse) and/or (slow operating fuse) on PCB indicate that replacement parts must be of identical designation.

REMARQUE
(POUR MODÈLE CANADIEN SEULEMENT)
Les symboles de fusible (fusible de type rapide) et/ou (fusible de type lent) sur CCI indiquent que les pièces de remplacement doivent avoir la même désignation.

1. SAFETY PRECAUTIONS

NOTICE: Comply with all cautions and safety related notes located on or inside the cabinet and on the chassis or picture tube.
The following precautions should be observed:

1. Do not install, remove, or handle the picture tube in any manner unless shatterproof goggles are worn. People not so equipped should be kept away while picture tubes are handled.
   Keep picture tube away from the body while handling.
2. When service is required, even though the PROJECTION MONITOR RECEIVER an isolation transformer should be inserted between power line and the set in safety before any service is performed.
3. The cut metallic sides of internal chassis, frames, etc. of the product may be burred in some cases.
   Therefore be careful not to injure your hands, etc. when handling the chassis, frame, etc.
4. When replacing a chassis in the set, all the protective devices must be put back in place, such as barriers, nonmetallic knobs, adjustment and compartment covershields, isolation resistor-capacitor, etc.
5. When service is required, obsèrve the original lead dress. Extra precaution should be taken to assure correct lead dress in the high voltage circuitry area.
6. Always use the manufacturer's replacement components. Especially critical components as indicated on the circuit diagram should not be replaced by other manufacture's.
   Furthermore where a short circuit has occurred, replace those components that indicate evidence of overheating.
7. Before returning a serviced set to the customer, the service technician must thoroughly test the unit to be certain that it is completely safe to operate without danger of electrical shock, and be sure that no protective device built into the set by the manufacturer has become defective, or inadvertently defeated during servicing.

Therefore, the following checks should be performed for the continued protection of the customer and service technician.

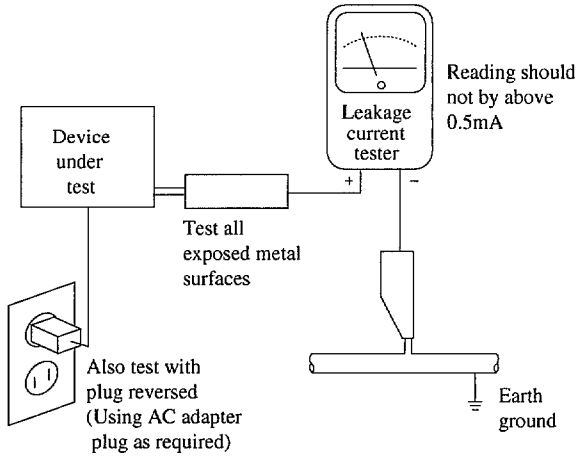
Leakage Current Cold Check

With the AC plug removed from the 220 to 230V AC 50/60Hz source, place a jumper across the two plug prongs. Turn the AC power switch on. Using an insulation tester (DC 500V), connect one lead to the jumpered AC plug and touch the other lead to each exposed metal part (input/ output terminals, screwheads, metal overlays, control shafts, etc.), particularly any exposed metal part having a return path to the chassis. Exposed metal parts having a return path to the chassis should have a minimum resistor reading of 0.3MΩ and a maximum resistor reading of 5MΩ. Any resistor value below or above this range indicates an abnormality which requires corrective action. Exposed metal parts not having a return path to the chassis will indicate an open circuit.

Leakage Current Hot Check

Plug the AC line cord directly into a 220 to 230V AC 50/60Hz outlet (do not use an isolation transformer for this check). Turn the AC power switch on.

Using a "Leakage Current Tester (Simpson Model 229 equivalent)", measure for current from all exposed metal parts of the cabinet (input / output terminals, screwheads, metal overlays, control shaft, etc.), particularly any exposed metal part having a return path to the chassis, to a known earth ground (water pipe, conduit, etc.). Any current measured must not exceed 0.5mA.


Reading should not by above 0.5mA
Leakage current tester
Device under test
+
–
Test all exposed metal surfaces
Also test with plug reversed (Using AC adapter plug as required)
Earth ground

AC Leakage Test

ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE ARE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED BEFORE RETURNING THE SET TO THE CUSTOMER.

High Voltage

This set is provided with a X-ray protection for clearly indicating that voltage has increased in excess of a predetermined value. Comply with all notes described in this Service Manual regarding this hold down circuit when servicing, so that this X-ray protection may correctly be operated.

Serviceman Warning

In the status of the black picture (video muting is being applied) when no signal is input, high voltage of this set during operation is less than 31.5kV. In case any component having some relation to the high voltage is replaced, confirm that the high voltage is lower than 31.5kV in the status of the black picture when no signal is input.

To measure H.V. use a high impedance H.V. meter.

Connect (–) to earth and (+) to the FBT anode cable connector.

(Refer to page 93)

X-radiation

TUBE: The primary source of X-radiation in this set is the picture tube.

For continued X-radiation protection, the replacement tube must be the same type as the original, PIONEER approved type.

The picture tube (CRT assy R, G, B) use in this set holds complete guarantee against X-ray radiation when the X-ray is sealed (See page 4). Accordingly, when the current in flowing to the picture tube (CRT assy R, G, B), be sure to perform it by putting the tube into X-ray sealed applied state. Avoid absolutely to flow the current to the picture tube (CRT assy R, G, B) itself. Moreover, when the voltage of the high voltage circuit becomes abnormally a little higher, the picture tube radiates X-rays. Accordingly, when servicing the high voltage circuit be sure to replace as an assy with the HIGH VOLTAGE assy in the manner in which has been adjusted to perform normal operation.

2. PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in PIONEER set have special safety related characteristics. These are often not evident from visual inspection nor the protection afforded by them necessarily can be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual.

Electrical components having such features are identified by marking with a ⚠ on the schematics and on the parts list in this Service Manual.

The use of a substitute replacement component which does not have the same safety characteristics as the PIONEER recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, X-radiation, or other hazards.

Product Safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current PIONEER Service Manual. A subscription to, or additional copies of PIONEER Service Manual may be obtained at a nominal charge from PIONEER.

3. CHARGED SECTION, HIGH VOLTAGE GENERATING POINT AND X-RAY PROTECTION

■ Charged section

The circuit in which the commercial AC power is used as it is without passing through the power supply transformer. If the charged section is touched, there is a risk of electric shock. In addition, the measuring equipment can be damaged if it is connected to the GND of the charged section and the GND of the non-charged section while connecting the set directly to the commercial AC power supply. In this case, be sure to connect the set via an insulated transformer and supply the current.

■ Charged section (Power supply primary side)

1. The primary side of the HIGH VOLTAGE assy
2. AC power cord
3. MAIN POWER switch
4. Fuse holder

▒▒▒ part is the charged section.

▨▨▨ part is the high voltage generating points other than the charged section.

■ High voltage generating point

The place where voltage of over 100V is generated.

1. Charged section	
2. HIGHT VOLTAGE assy (including FBT)	(31.5kV, 135V)
3. DEFLECTION assy	(Approx.1300V at peak)
4. R. CRT DRIVE assy	(10.5kV)
5. G. CRT DRIVE assy	(10.5kV)
6. B. CRT DRIVE assy	(10.5kV)
7. CRT assy R	(30.0kV)
8. CRT assy G	(30.0kV)
9. CRT assy B	(30.0kV)
10. Focus variable resistor(VR1)	(10.5kV)
11. Deflection yokes (L1, L2 and L3)	(Approx.1100V at peak)

■X-ray protection

- Regarding the parts which are relative to radiation of X-rays (There is the danger to radiate X-ray from the individual CRT assy R, G, B), there are notifications of caution in the individual schematic diagrams. Be sure to read them for safety's sake.
- The component parts for X-ray protection are as follows : When the current flows to the CRT assy R, G, B, by sure to perform it with these parts being attached. Protection from the X-ray radiation is maintained in the state in which these parts have been installed to the CRT assy R, G, B. Accordingly, never supply current only to the CRT assy R,G,B.
  Moreover, the anode voltage of the CRT assy R, G, B should always be kept not higher than the predetermined value (in the minimum brightness and picture state when non signal input is higher than 31.9kV). Be sure to drive the CRT assy R, G, B by using a completely functional HIGH VOLTAGE assy which have been adjusted completely in the combined state. (When the voltage abnormally becomes high, the X-ray protection circuit will operate.)

1. CRT assy R, G, B (Do not dismantle CRT assemblies under any circumstances.)
2. Each Lens assy

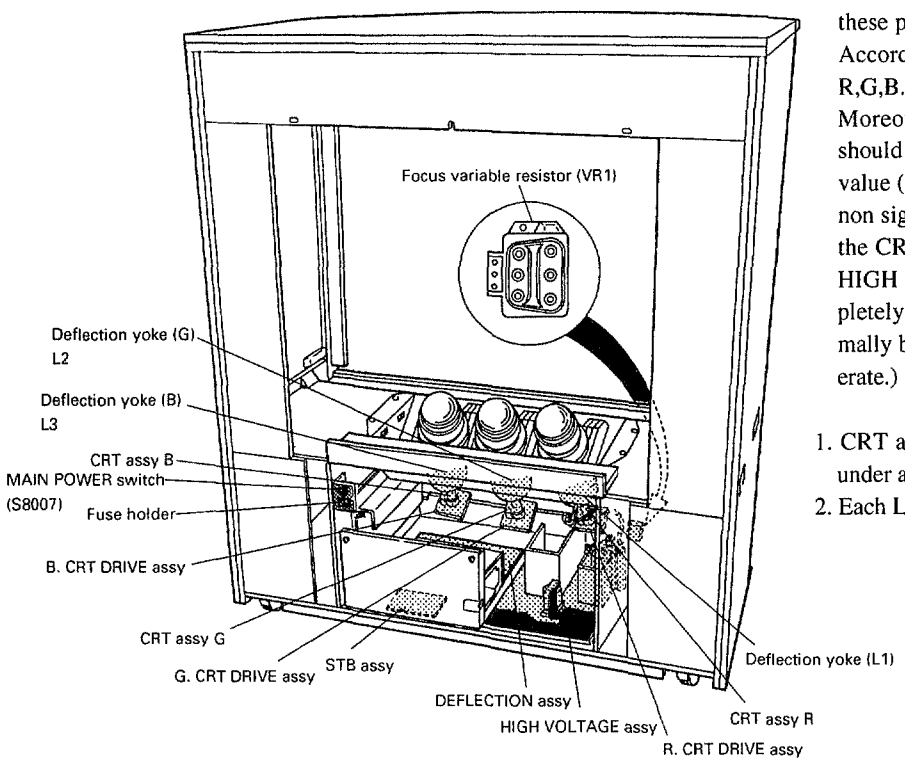


Fig. 1 Charged section and high voltage generating point

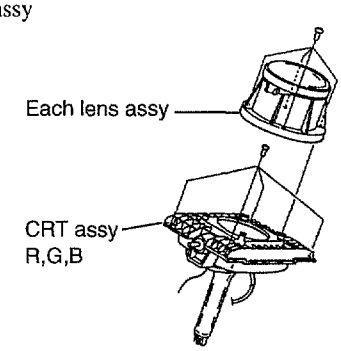


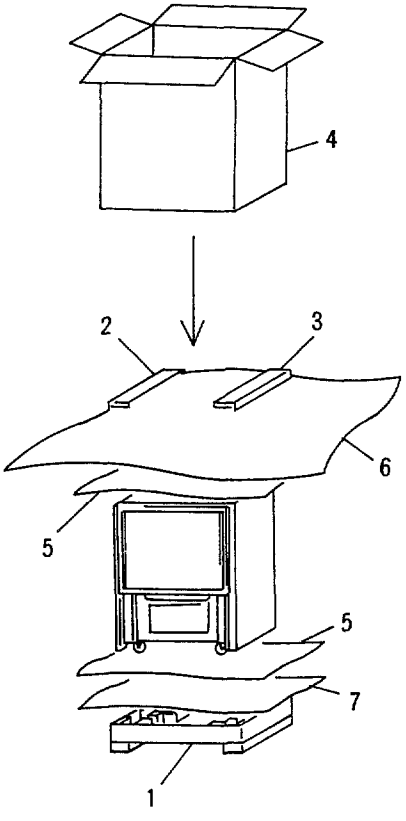
Fig. 2 Component parts for X-ray protection

4. EXPLODED VIEWS, PACKING AND PARTS LIST

NOTES:

- *Parts marked by "NSP" are generally unavailable because they are not in our Master Spare Parts List.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the parts. Therefore, when replacing, be sure to use parts of identical designation.*
- *Parts marked by " ⊙ " are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*
- *Parts marked by ☆ are important parts which relate X-rays radiation.*
  If any of these parts need to be replaced, always replace with specified parts.

4.1 PACKING



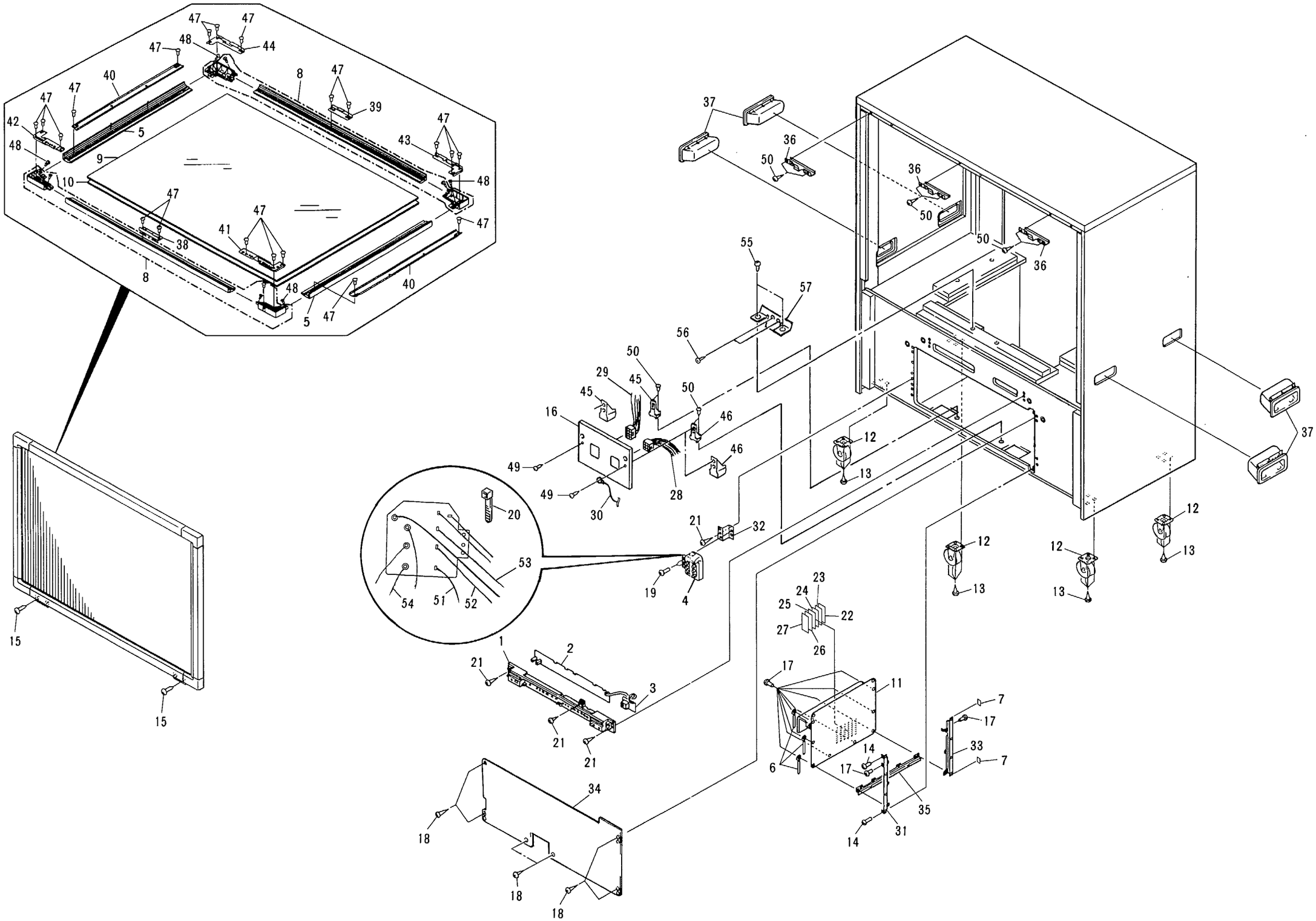
Parts List

Mark	No.	Description	Parts No.
	1	UNDER CARTON 50	AHD2815
	2	UPPER PAD (L)	AHA2082
	3	UPPER PAD (R)	AHA2083
	4	UPPER CARTON	AHD2881
NSP	5	PACKING SHEET	AHG1036
NSP	6	VINYL SHEET XL	AHG1109
NSP	7	VINYL SHEET S	AHG1111

4.2 FRONT VIEW

Parts List

Mark	No.	Description	Parts No.
	1	FRONT PANEL ASSY	AMB2598
	2	FRONT CONTROL ASSY	AWZ5249
	3	RECEIVER ASSY	AWZ5250
⚠	4	VR1 FOCUS VR	ACX1082
	5	SCREEN FRAME V	AAP1526
	6	BINDER	AEP-215
	7	STAY SPACER	AEC1317
	8	SCREEN FRAME H ASSY	AAP1527
	9	FRESNEL (50)	AMR2756
	10	LENTICULAR SHEET (50)	AMR2755
	11	CONVERGENCE ASSY	AWV1516
	12	CASTER	AMR2757
	13	SCREW	PMB50P400FZB
	14	SCREW	BYC40P200FMC
	15	SCREW	ABA1118
	16	INPUT PANEL	ANB1832
	17	SCREW	VBZ30P100FMC
	18	SCREW	BYC35P160FZK
	19	SCREW	BBZ30P080FZK
	20	BINDER	AEC-093
	21	SCREW	BYC35P120FZB
	22	CONVERGENCE GH ASSY	AWZ4500
	23	CONVERGENCE H1 ASSY	AWZ4501
	24	CONVERGENCE H2 ASSY	AWZ4502
	25	CONVERGENCE V1 ASSY	AWZ4503
	26	CONVERGENCE V2 ASSY	AWZ4504
	27	CONVERGENCE V3 ASSY	AWZ4505
NSP	28	9P HOUSING WIRE	ADX2209
NSP	29	12P HOUSING WIRE	ADX2280
	30	2P LEAD WIRE	ADX2211
NSP	31	FRONT CONVERGENCE FRAME	ANG1493
NSP	32	VR HOLDER	ANG1404
NSP	33	REAR CONVERGENCE FRAME	ANG1494
NSP	34	BLIND PLATE	AMR2913
NSP	35	CONVERGENCE STAY	AND1035
NSP	36	CABINET UPPER HOLDER	ANG1663
NSP	37	HANDLE	ANZ-317
NSP	38	CENTER FRAME STAY	ANG1648
NSP	39	FRAME FITTING	ANG1708
NSP	40	SCREEN HOLDER V (50)	ANG1834
NSP	41	UNDER CORNER STAY L	ANG1908
NSP	42	UNDER CORNER STAY R	ANG1909
NSP	43	UPPER CORNER STAY L	ANG1997
NSP	44	UPPER CORNER STAY R	ANG1998
	45	PANEL ANGLE L	AMR2693
	46	PANEL ANGLE R	AMR2694
	47	SCREW	BYC40P120FMC
	48	SCREW	OYC40P160FZK
	49	SCREW	BPZ30P100FZK
	50	SCREW	BYC35P140FZB
	51	1P LEAD WIRE (J4)	ADX1307
	52	1P LEAD WIRE (J5)	ADX1308
	53	1P LEAD WIRE (J6)	ADX1309
	54	1P LEAD WIRE (J7)	ADX1310
	55	SCREW	PMB40P250FZB
	56	SCREW	ABA1163
NSP	57	CRT FRONT HOLDER	ANG2121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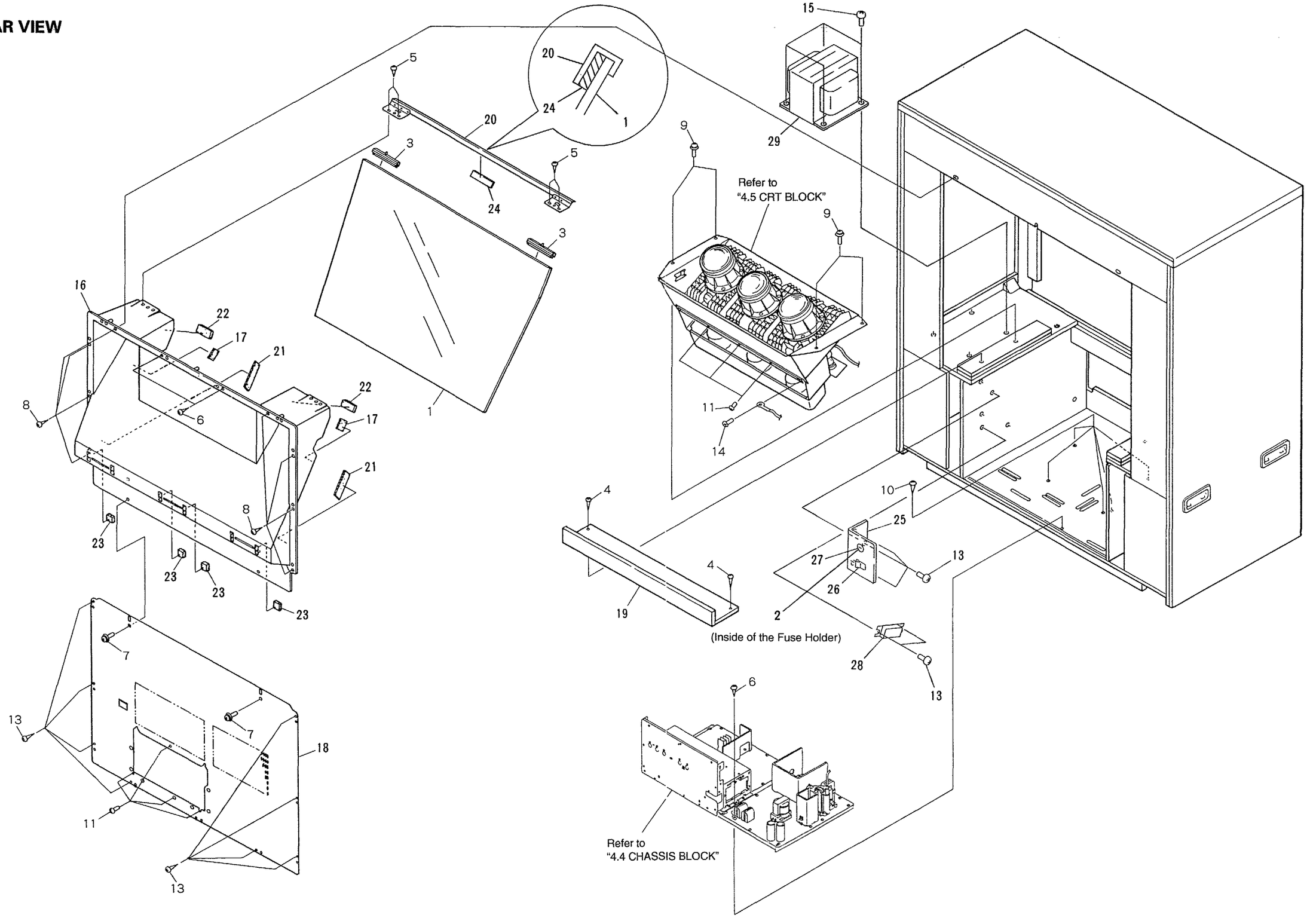
4.3 REAR VIEW


Refer to
"4.5 CRT BLOCK"
(Inside of the Fuse Holder)
Refer to
"4.4 CHASSIS BLOCK"

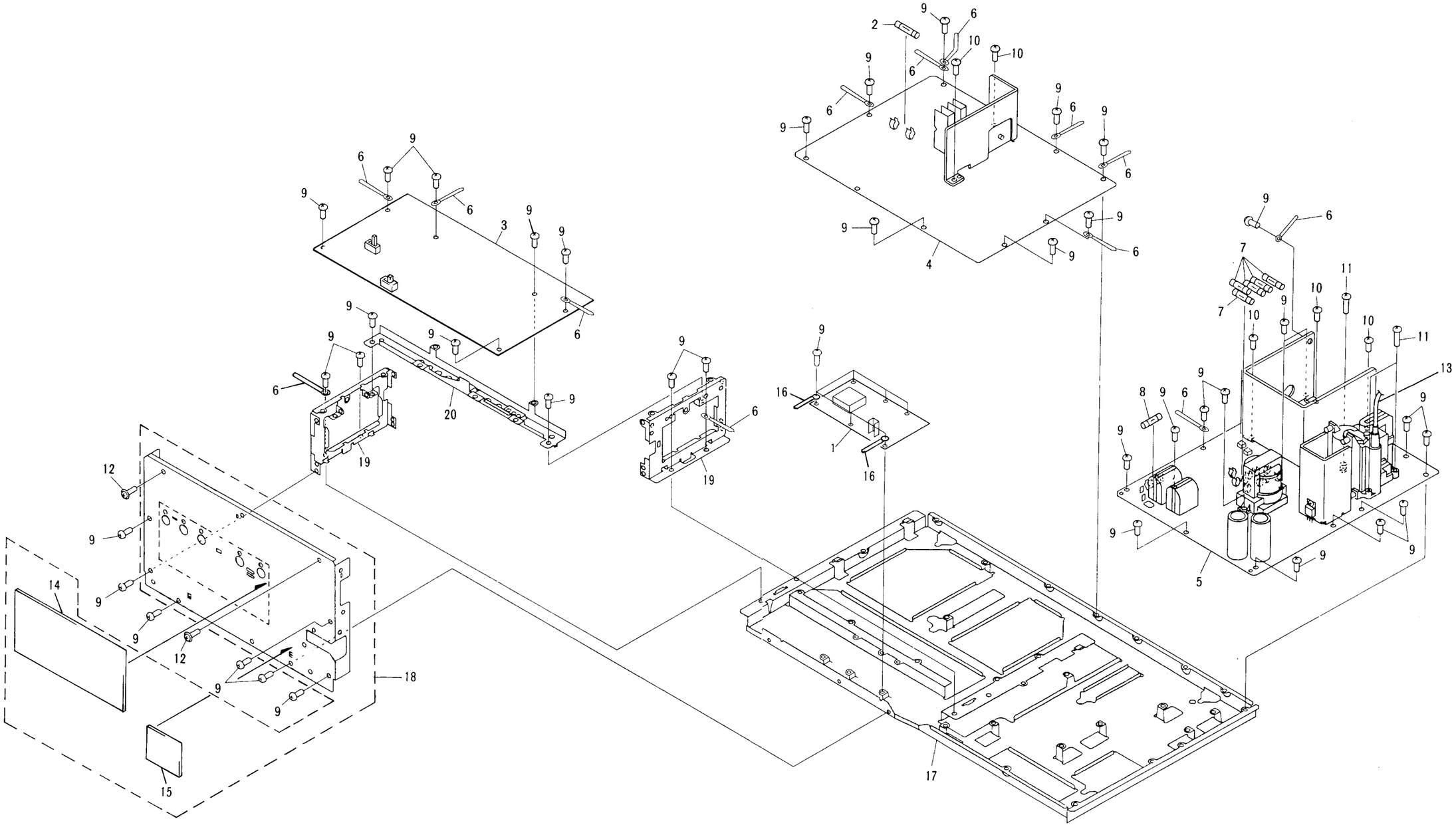
Parts List

Mark	No.	Description	Parts No.
	1	MIRROR	AMR1425
⚠	2	FUSE (FU2007 : T6.3A/250V)	AEK1039
	3	RUBBER CUSHION	AEC1125
	4	SCREW	BYC40P250FMC
	5	SCREW	ABA1069
	6	SCREW	BYC40P160FMC
	7	SCREW	ABA1005
	8	SCREW	BYC35P160FZK
	9	SCREW	ABA1161
	10	SCREW	ABA1121
	11	SCREW	BBZ30P080FZK
NSP	12	.....	
	13	SCREW	BYC35P120FZB
	14	SCREW	VBT30P080FZK
	15	SCREW	PMB40P250FZB
NSP	16	MIRROR CASE (50)	AME1019
NSP	17	MIRROR HOLD CUSHION	AEC1296
NSP	18	REAR COVER	ANF1666
NSP	19	BACK COVER PANEL	AMM2742
NSP	20	MIRROR HOLD STAY	ANG1271
NSP	21	RUBBER CUSHION	AEC1124
NSP	22	CUSHION SHEET B	AEC1111
NSP	23	CUSHION SHEET A	AEC1110
	24	N CUSHION	AEC1683
NSP	25	POWER SUPPLY CHASSIS N	ANG2134
⚠	26	SEESAW SWITCH (S8007)	BSM1010
⚠	27	FUSE HOLDER	BKR1003
NSP⚠	28	COIL (T1)	ATT1276
NSP⚠	29	SEPARATE TRANSFORMER (T2 :220-230V to 100V)	AMM2715

4.4 CHASSIS BLOCK

Parts List

Mark	No.	Description	Parts No.
	1	STB ASSY	AWZ5253
⚠	2	FUSE (250mA/125V, FU1001)	AEK1036
	3	U-COM ASSY	AWZ6015
	4	DEFLECTION ASSY	AWV1350
☆	5	HIGH VOLTAGE ASSY	AWV1505
	6	BINDER	AEP-215
⚠	7	FUSE (T4A/250V, FU2002-FU2006)	AEK-514
⚠	8	FUSE (T6.3A/250V, FU2001)	AEK-516
	9	SCREW	BBZ30P080FZK
	10	SCREW	ABA1099
	11	SCREW	VBZ30P200FMC
	12	SCREW	ABA1089
⚠	13	ANODE CABLE	ADY1012
NSP	14	REAR PANEL SHEET A	AAK2684
NSP	15	REAR PANEL SHEET B	AAK2644
	16	BINDER	AEC-826
NSP	17	CHASSIS	ANA1216
NSP	18	REAR PANEL ASSY	ANC2293
NSP	19	SIDE FRAME	ANG1448
NSP	20	FRAME	ANG1449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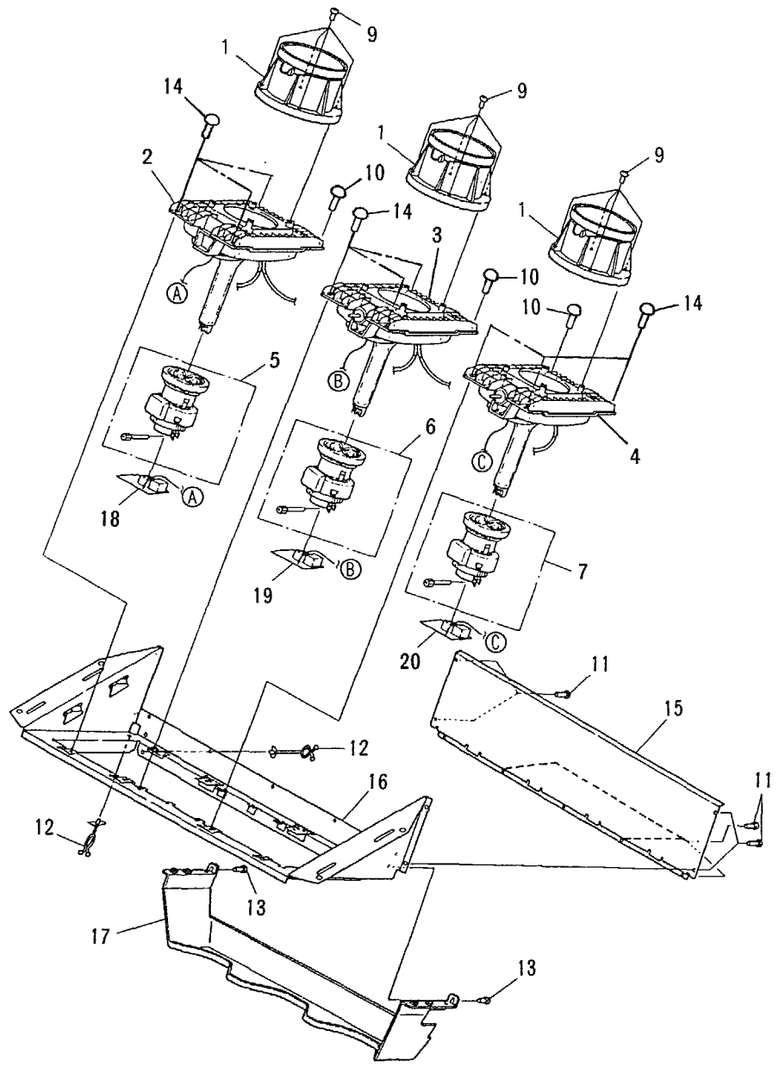
4.5 CRT BLOCK

Parts List

Mark	No.	Description	Parts No.
☆	1	LENS ASSY (50)	AMR2482
☆⚠	2	CRT ASSY (R)	AWY1287
☆⚠	3	CRT ASSY (G)	AWY1288
☆⚠	4	CRT ASSY (B)	AWY1289
⚠	5	DEFLECTION YOKE (L1)	ATL1104
⚠	6	DEFLECTION YOKE (L2)	ATL1104
⚠	7	DEFLECTION YOKE (L3)	ATL1104
	8	SCREW	VBT30P080FZK
	9	SCREW	AMZ40P080FZK
	10	SCREW	FBT40P120FZK
	11	SCREW	BBZ30P080FZK
NSP	12	LEAD CLAMPER	AEP-329
	13	SCREW	ABZ30P120FZK
	14	SCREW	ABA1163
NSP	15	COVER L	ANF1053
NSP	16	CRT STAND	ANA1129
NSP	17	TRAY	AMR2563
	18	R.CRT DRIVE ASSY	AWZ3860
	19	G.CRT DRIVE ASSY	AWZ3861
	20	B.CRT DRIVE ASSY	AWZ3862



5. SCHEMATIC AND PCB CONNECTION DIAGRAMS

5.1 CONNECTION OF INPUT/OUTPUT CONNECTORS

12P Connector

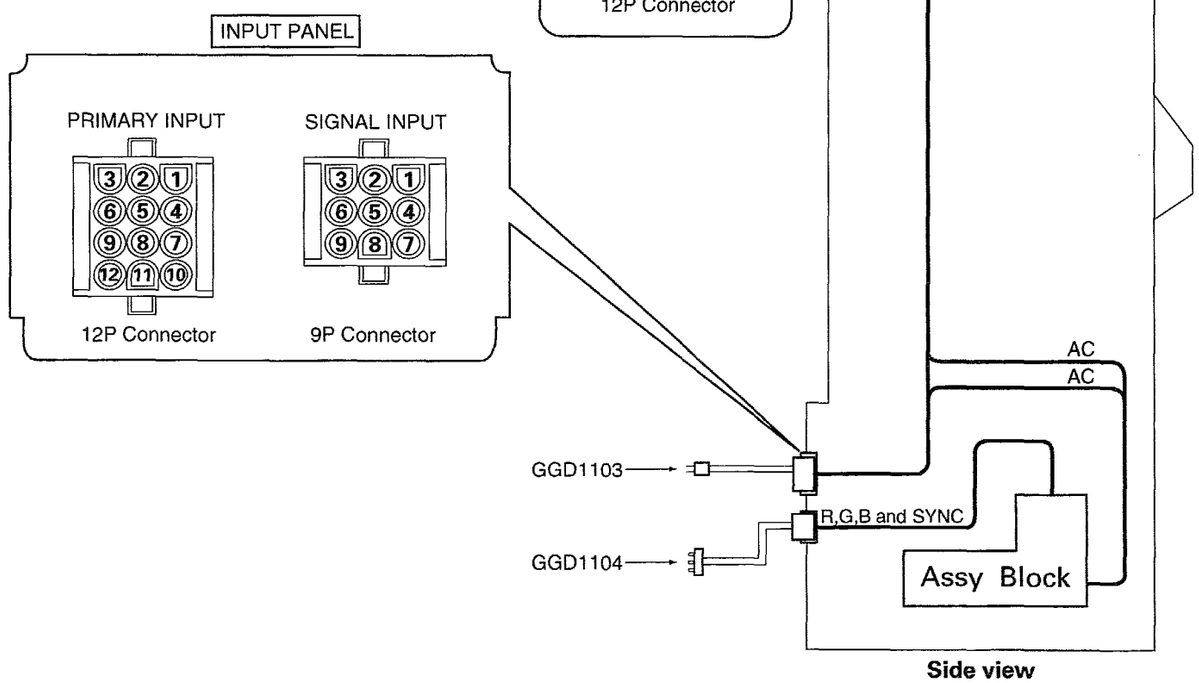
Pin No.	Purpose
1	GND
2	AC 1
3	AC 2
4	Sig 1
5	Sig 2
6	Sig 3
7	Sig 4
8	Sig 5
9	Sig 6
10	Sig 7
11	—
12	—

9P Connector

Pin No.	Purpose
1	R Input
2	G Input
3	B Input
4	R-GND
5	G-GND
6	B-GND
7	SYNC
8	SYNC-GND
9	Open

* This unit is set by RGB input, but it can be input the normal video signal from G input by switching the S5502 switch of U-COM ASSY in the unit.

The power supply and the reflection (image) signal are input here from the game machine for normal use.

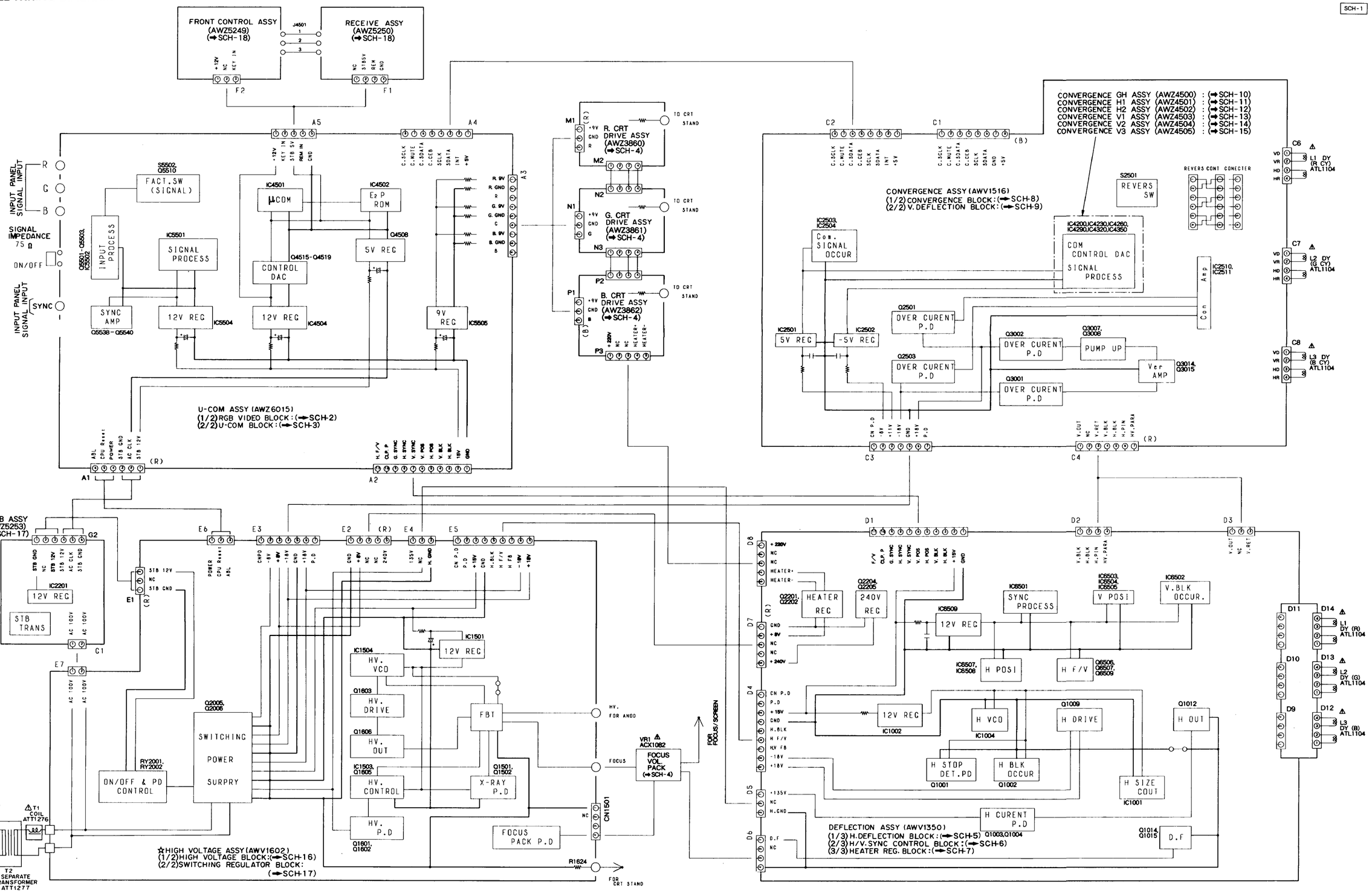


Note :
The output panel is used for lighting the game machine.

Side view

5.2 OVERALL WIRING DIAGRAM

SCH-1



NOTE FOR SCHEMATIC DIAGRAMS (Type 5A)

1. **When ordering service parts, be sure to refer to "PARTS LIST of EXPLODED VIEWS" or "PCB PARTS LIST".**
2. **Since these are basic circuits, some parts of them or the values of some components may be changed for improvement.**
3. **RESISTORS:**
   Unit: kΩ, MΩ, or Ω unless otherwise noted.
   Rated power: 1/4W, 1/6W, 1/8W, 1/10W unless otherwise noted.
   Tolerance: (F): ±1%, (G): ±2%, (K): ±10%, (M): ±20% or ±5% unless otherwise noted.
4. **CAPACITORS:**
   Unit: pμF or μF unless otherwise noted.
   Ratings: capacitor (μF)/ voltage (V) unless otherwise noted.
   Rated voltage: 50V except for electrolytic capacitors.
5. **COILS:**
   Unit: mmH or μH unless otherwise noted.
6. **VOLTAGE AND CURRENT:**
   ⊏⊐ or ⊏ V :
   DC voltage (V) at no input signal unless otherwise noted.
   Value in ( ) is DC voltage at color bar signal input state.
   ⇨ mA or ⇦ mA :
   DC current at no input signal unless otherwise noted.
7. **OTHERS:**
   • ⊘ or ⊘ : Adjusting point.
   • ⊸ : Measurement point.
   • The ⚠ mark found on some component parts indicates the importance of the safety factor of the parts. Therefore, when replacing, be sure to use parts of identical designation.
   • Parts marked by ☆ are important parts which relate to X-rays radiation. If any of these parts needs to be replaced, always replace with specified parts.
   • Parts marked by ✕ are important parts which relate to X-rays radiation. If a failure occurs in any of these parts, replace the printed circuit board assembly where the relevant part has already been adjusted as a working component. Do not replace the actual part itself. If any part marked by ✕ is replace, there is danger of being exposed to X-rays.
8. **SCH-□ ON THE SCHEMATIC DIAGRAM:**
   • SCH-□ indicates the drawing number of the schematic diagram. (SCH stands for schematic diagram.)
9. **SWITCHES** (Underline indicates switch position):
   CONVERGENCE ASSY
   S2501 : REVERSE-NORMAL
   FRONT CONTROL ASSY
   S4501 : POWER ON/OFF
   S4502 : GAME MODE
   S4503 : PICTURE ADJUSTMENT –
   S4504 : H/V] CONVERGENCE ADJUSTMENT
   S4505 : ADJUSTMENT MENU +] CONVERGENCE ADJUSTMENT
   S4506 : CONVERGENCE MENORY SELECTION
   S4507 : INT
   S4508 : PICTURE ADJUSTMENT +
   S4509 : RGB SELECTION
   S4510 : ADJUSTMENT –] CONVERGENCE ADJUSTMENT
   S4511 : CONVERGENCE
   S4512 : PICTURE ADJUSTMENT SELECTION
   S4513 : DISPLAY OFF
   S4514 : FACTORY ADJ
   S4515 : ADJUSTMENT +] CONVERGENCE ADJUSTMENT
   D4516 : ADJUSTMENT MENU

µ-COM ASSY
S5501 : SIGNAL IMPEDANCE 75Ω ON-OFF
S5502 : SERVICE SWITCH SERVICE-NORMAL

5.3 U-COM ASSY (1/2)

U-COM ASSY (1/2) (AWZ6015)
• RGB VIDEO BLOCK

(R) : R. Signal Route
(G) : G. Signal Route
(B) : B. Signal Route

SCH – 2

Q5549:
POWER OFF MUTE

Q5501 - Q5503, Q5507 - Q5509 :
BUFFER

IC5506 :
+ 5V REGULATOR

IC5505 :
+ 9V REGULATOR

IC5504 :
+ 12V REGULATOR

Q5519 - Q5524 :
BLANKING AMP

Q5525 - Q5530 :
OSD SIGNAL AMP

Q5532 - Q5534 :
BUFFER

Q5537 :
R. INVERTER AMP

Q5540 :
FILTER BUFFER

IC5501 : VIDEO AMP

Q5536 :
G. INVERTER AMP

Q5546 :
VIDEO MUTE

Q5544 :
BUFFER

Q5547 : VIDEO MUTE

Q5535 : B. INVERTER AMP

Q5510 :
BUFFER

IC5502 :
GAIN CONTROL

Q5541 - Q5543 :
INVERTER AMP

Q5545 :
BUFFER

Q5548 : VIDEO MUTE

Q5504 :
BUFFER

Q5513 :
BUFFER

IC5503 :
BLANKING CONTROL

Q5531 :
BLANKING PULSE
BUFFER

Q5538, Q5539 :
BUFFER

Q5505 :
CONTRAST CONTROL

Q5506, Q5511 :
CONTRAST BUFFER

Q5512, Q5514, Q5515 :
AUTOMATIC CONTRAST
LIMITER for PEAK

Q5516 - Q5518 :
BUFFER

INPUT PANEL
SINAL INPUT

CN8007 AKC1016
CN8008 AKC1016
CN8009 AKC1016
CN8010 AKC1016
CN8011 AKC1016
CN8012 AKC1016

SIGNAL
IMPEDANCE
75 Ω
ON – OFF

INPUT PANEL
SIGNAL INPUT
SYNC
CN8013 AKC1016
CN8014 AKC1016

U-COM
BLOCK
(➡SCH-3)
GAIN2
GAIN1
ABL
CONTRAST

+ 15V
+ 12V
U-COM BLOCK (➡SCH-3)

A3
R. 9V
R. GND
R
G. 9V
G. GND
G
B. 9V
B. GND
B
R. CRT DRIVE ASSY M1 (➡SCH-4)
G. CRT DRIVE ASSY N1 (➡SCH-4)
B. CRT DRIVE ASSY P1 (➡SCH-4)

BRIGHT
R_GAIN
B_GAIN
U-COM BLOCK (➡SCH-3)

V_MUTE
B.OSD
G.OSD
R.OSD
B.MUTE
G.MUTE
R.MUTE
INT
BLK.
V.BLK
H.BLK
U-COM BLOCK (➡SCH-3)

GND
15V
H.BLK
V.BLK
H.POS
V.POS
V.SYNC
H.SYNC
G.SYNC
CLP.P
H.F/V
DEFLECTION ASSY (2/3) D1 (➡SCH-6)

H.F/V
V.POS
H.POS
U-COM BLOCK (➡SCH-3)

A2

Note :
: 2SC2458
: 2SA1048
: HSS104-02

IC5501 (M51387P)

Pin No.	Voltage (V)	Pin No.	Voltage (V)
1	0.5	16	3.4
2	11.9	17	0.1
3	2.7	18	0.1
4	4.7	19	4
5	3	20	4.3
6	11.9	21	3.1
7	2.7	22	0.1
8	5.5	23	4.1
9	3	24	4.4
10	11.9	25	3.2
11	2.7	26	0.1
12	4.7	27	4
13	3	28	4.3
14	6.5	29	3.1
15	13.8	30	11.9

IC5502 (SN74LS05N)

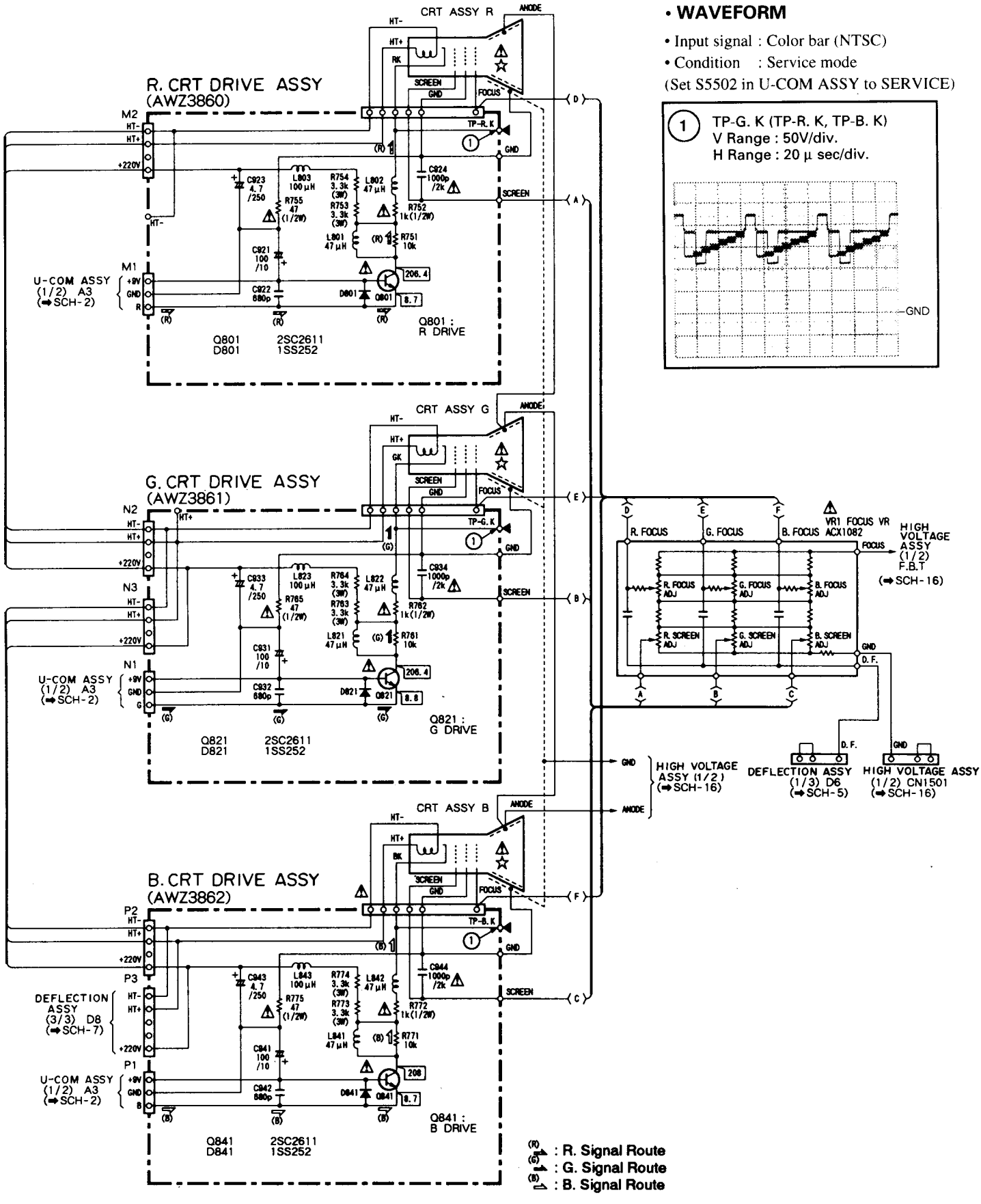
Pin No.	Voltage (V)	Pin No.	Voltage (V)
1	0.3	8	0
2	0	9	0.3
3	0.3	10	0
4	0	11	0.3
5	0.3	12	0
6	0	13	0.3
7	0	14	5

IC5503 (SN74LS05N)

Pin No.	Voltage (V)	Pin No.	Voltage (V)
1	1.2	8	0
2	4.1	9	0
3	1.2	10	0
4	4.1	11	0
5	1.2	12	0
6	4.1	13	0
7	0	14	5

5.5 R. G. B. CRT DRIVE ASSY

SCH-4



• WAVEFORM

• Input signal : Color bar (NTSC)
• Condition : Service mode
(Set S5502 in U-COM ASSY to SERVICE)

(R) : R. Signal Route
(G) : G. Signal Route
(B) : B. Signal Route

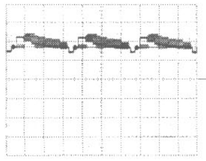
R. CRT DRIVE ASSY
G. CRT DRIVE ASSY
B. CRT DRIVE ASSY

SCH-4

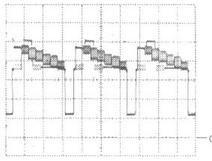
• WAVEFORMS for U-COM ASSY

• Input signal : Color bar (NTSC)
• Condition : Service mode (Set S5502 in U-COM ASSY to SERVICE)

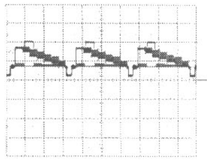
(1) TP5506 (G IN)
V Range : 1V/div.
H Range : 20 μ sec/div.



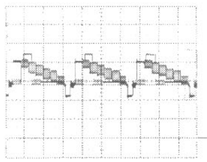
(3) TP5504 G
(TP5503 R, TP5505 B)
V Range : 1V/div.
H Range : 20 μsec/div.



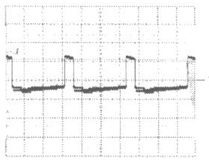
(5) Q5510 Emitter
(G. SYNC OUT)
V Range : 50mV/div.
H Range : 20 μsec/div.



(2) Q5520 Emitter
(Q5519 Emitter, Q5521 Emitter)
V Range : 1V/div.
H Range : 20 μsec/div.



(4) Q5536 Collector
(Q5535 Collector, Q5537 Collector)
V Range : 1V/div.
H Range : 20 μsec/div.



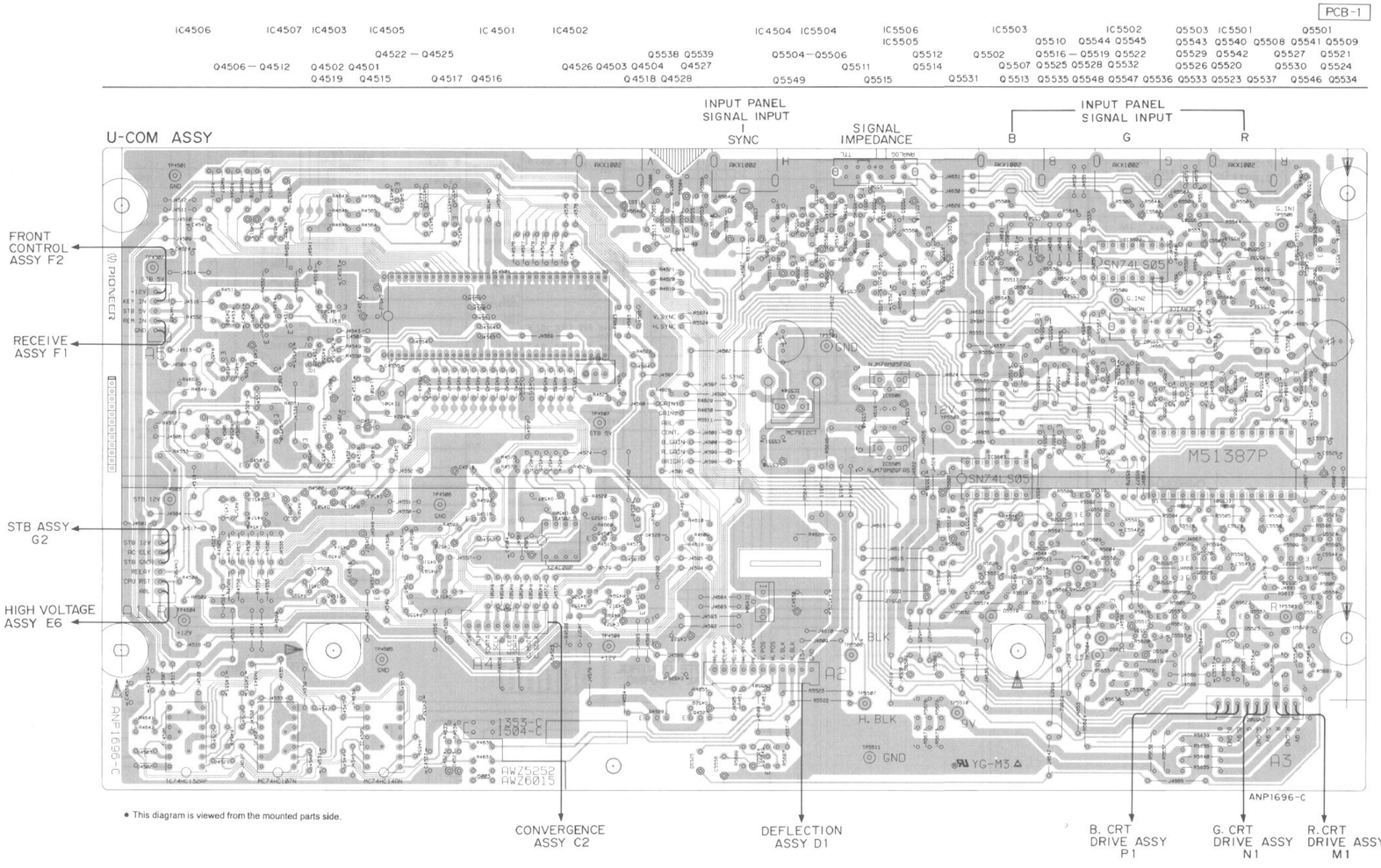
NOTE FOR PCB DIAGRAMS:

1. Part numbers in PCB diagrams match those in the schematic diagrams.
2. A comparison between the main parts of PCB and schematic diagrams is shown below:

Symbol in PCB Diagrams	Symbol in Schematic Diagrams	Part Name
B C E	B C E B C E	Transistor
B C E	B C E B C E	Transistor with resistor
D G S	D G S D G S	Field effect transistor
		Resistor array
		3- terminal regulator

3. The parts mounted on each PCB include all necessary parts for several destinations. For further information for respective destinations, be sure to check with the schematic diagram.

PCB-1



• This diagram is viewed from the mounted parts side.

SCH-3

Q4501 : IRREGULAR CONDITION RESET

Q4508 : REGULATOR

Q4510 : OVER CURRENT DET.

Q4512 : INHIBIT RESET when POWER ON

IC4503 : RESET

Q4507 : OVER CURRENT LIMITER

U-COM ASSY (2/2) (AWZ6015)
• U-COM BLOCK

IC4504 : + 12V REGULATOR

HIGH VOLTAGE ASSY (2/2) E6 (➡SCH-17)
ABL
CPU_RESET
POWER
STB_GND
AC_CLK
STB 12V

STB_ASSY G2 (➡SCH-17)

Note :
: HSS104-02

IC4501 : MICROCOMPUTER

Q4506 : INVERTER BUFFER

Q4502 : INVERTER BUFFER

Q4525,Q4526 : INVERTER BUFFER

RGB VIDEO BLOCK (➡SCH-2)
INT

CONVERGENCE ASSY (1/2) C2 (➡SCH-8)
C.SCLK
C.MUTE
C.SDATA
C.CEB
SCLK
SDATA
INT
+5V

IC4502 : NON-VOLATILE MEMORY

Q4503,Q4504 : INVERTER BUFFER

Q4509,Q4511 : REMOTE CONTROL SIGNAL SHAPING

Q4522-Q4524 : INVERTER BUFFER

Q4515-Q4519 : CONTROL SIGNAL D/A CONVERTER

Q4527,Q4528 : BUFFER

IC4505-IC4507 : V. BLK PHASE SHIFTER

IC4507 (MC74HC107N)

Inputs				Outputs	
Reset	Clock	J	K	Q	Q
L	X	X	X	L	H
H	↓	L	L	NO Change	
H	↓	L	H	L	H
H	↓	H	L	H	L
H	↓	H	H	Toggle	
H	L	X	X	NO Change	
H	H	X	X	NO Change	
H	↑	X	X	NO Change	

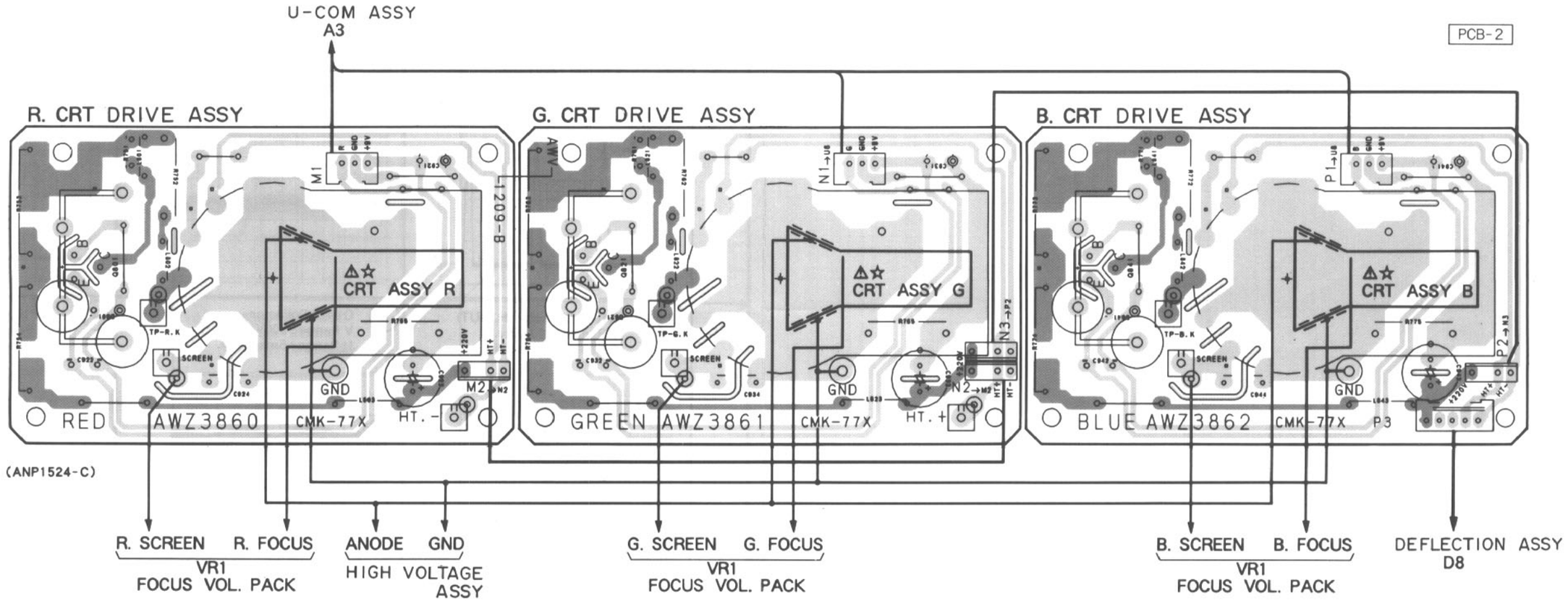
RGB VIDEO BLOCK (➡SCH-2)
+12V
H.F/V
ABL
R.MUTE
G.MUTE
B.MUTE
BRIGHT
CONTRAST
BLK
B.OSD
G.OSD
R.OSD
V.BLK
H.BLK
V.MUTE

RGB VIDEO BLOCK (➡SCH-2)
GAIN1
GAIN2
H.POS
V.POS
R_GAIN
B_GAIN

RECEIVE ASSY F1 (➡SCH-18)
CN4503 KW2SOMAS
GND
REM-IN
STB 5V
KEY IN
+12V
A5
FRONT CONTROL ASSY F2 (➡SCH-18)

▒▒ mark shows a high voltage generation point (excepting the charged section).

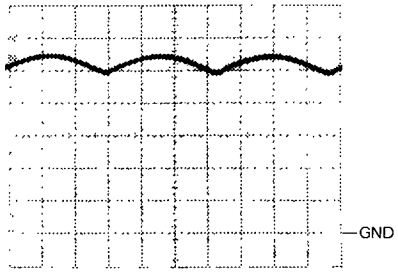
• This diagram is viewed from the mounted parts side.



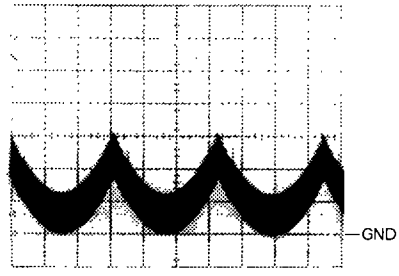
• WAVEFORMS for DEFLECTION ASSY

• Input signal : Color bar (NTSC)
• Condition : Service mode (Set S5502 in U-COM ASSY to SERVICE)

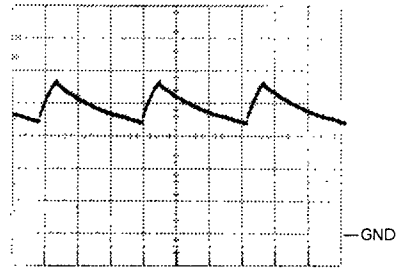
(1) D1033 Cathode
V Range : 20V/div.
H Range : 5msec/div.



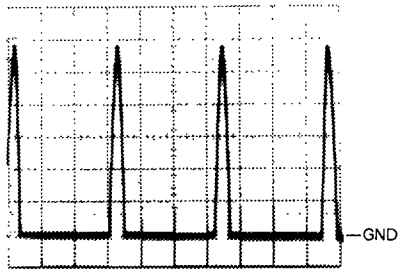
(3) - 2 TP1012 (H.V. PARA)
V Range : 1V/div.
H Range : 20μ sec/div.



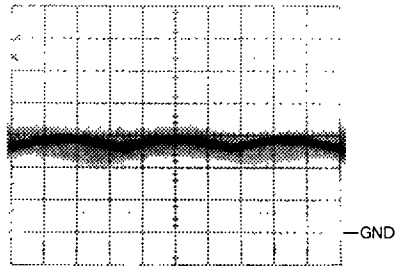
(7) IC1004 Pin3
V Range : 1V/div.
H Range : 20 μ sec/div.



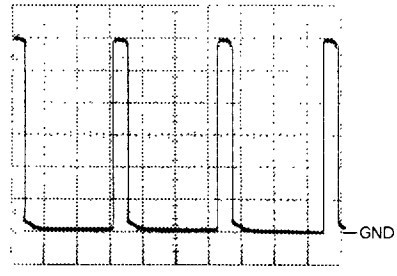
(2) - 1 Q1012 Collector (H. OUT)
V Range : 200V/div.
H Range : 20 μ sec/div.



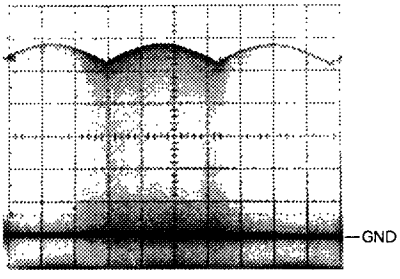
(4) D1038 Cathode
V Range : 500V/div.
H Range : 5msec/div.



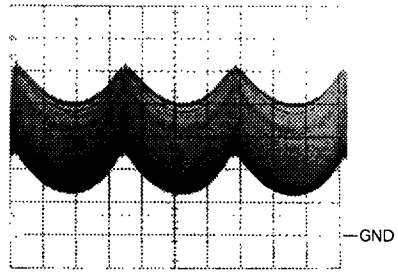
(8) TP1005 (H. BLK)
V Range : 2V/div.
H Range : 20 μ sec/div.



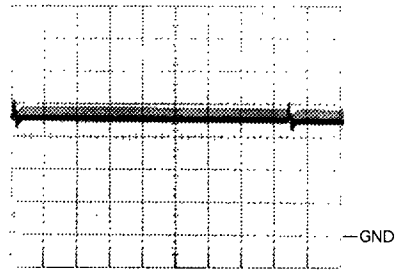
(2) - 2 Q1012 Collector (H. OUT)
V Range : 200V/div.
H Range : 5msec/div.



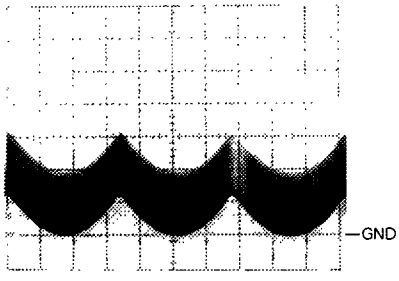
(5) Q1015 Collector
V Range : 200V/div.
H Range : 5msec/div.



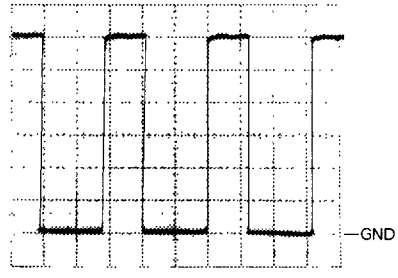
(9) - 1 TP1008 (AFC)
V Range : DC 2V/div.
H Range : 2msec/div.



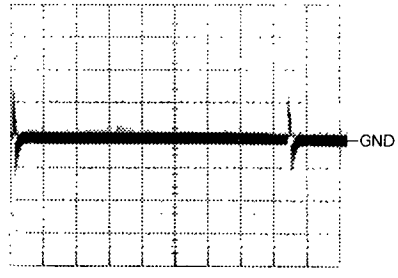
(3) - 1 TP1012 (H.V. PARA)
V Range : 1V/div.
H Range : 5msec/div.



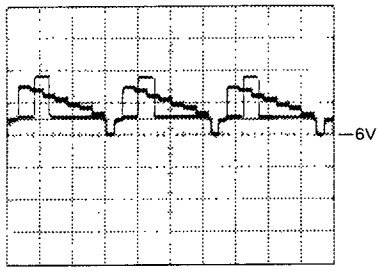
(6) TP1013 (H. D)
V Range : 2V/div.
H Range : 20 μ sec/div.



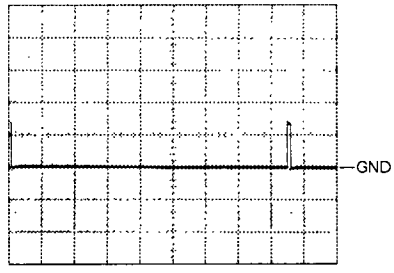
(9) - 2 TP1008 (AFC)
V Range : AC 0.5V/div.
H Range : 2msec/div.



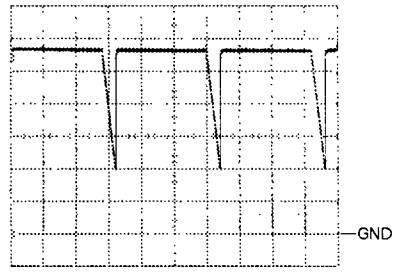
(10) 06521 Emitter (G. SYNC)
V Range : 50mV/div.
H Range : 20 μ sec/div.



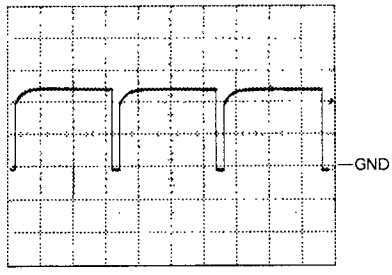
(14) Q6502 Base (V. SYNC)
V Range : 0.5V/div.
H Range : 2msec/div.



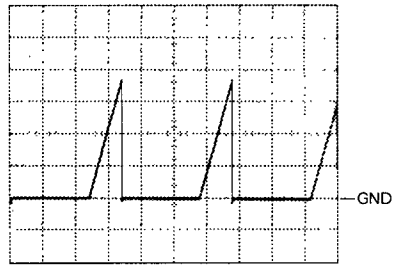
(18) Q6519 Emitter
V Range : 2V/div.
H Range : 20 μ sec/div.



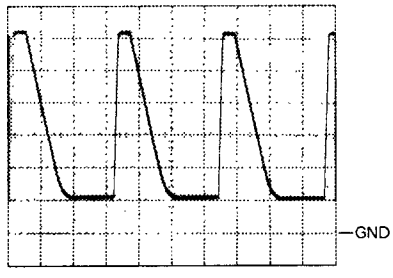
(11) TP6503 (H. SYNC)
V Range : 5V/div.
H Range : 20 μ sec/div.



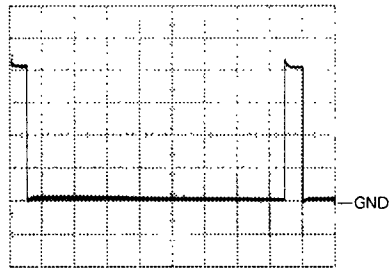
(15) IC6505 Pin2
V Range : 2V/div.
H Range : 5msec/div.



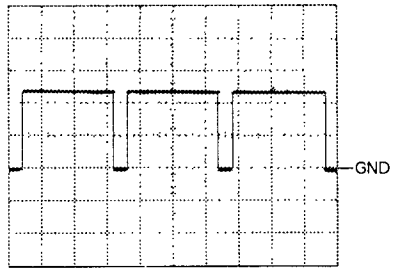
(12) IC6507 Pin3
V Range : 2V/div.
H Range : 20 μ sec/div.



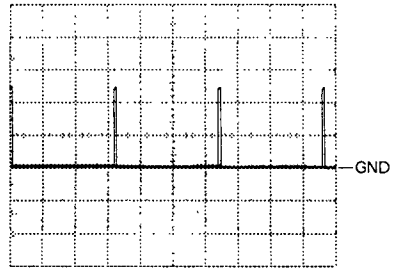
(16) TP6508 (VD. OUT)
V Range : 2V/div.
H Range : 2msec/div.



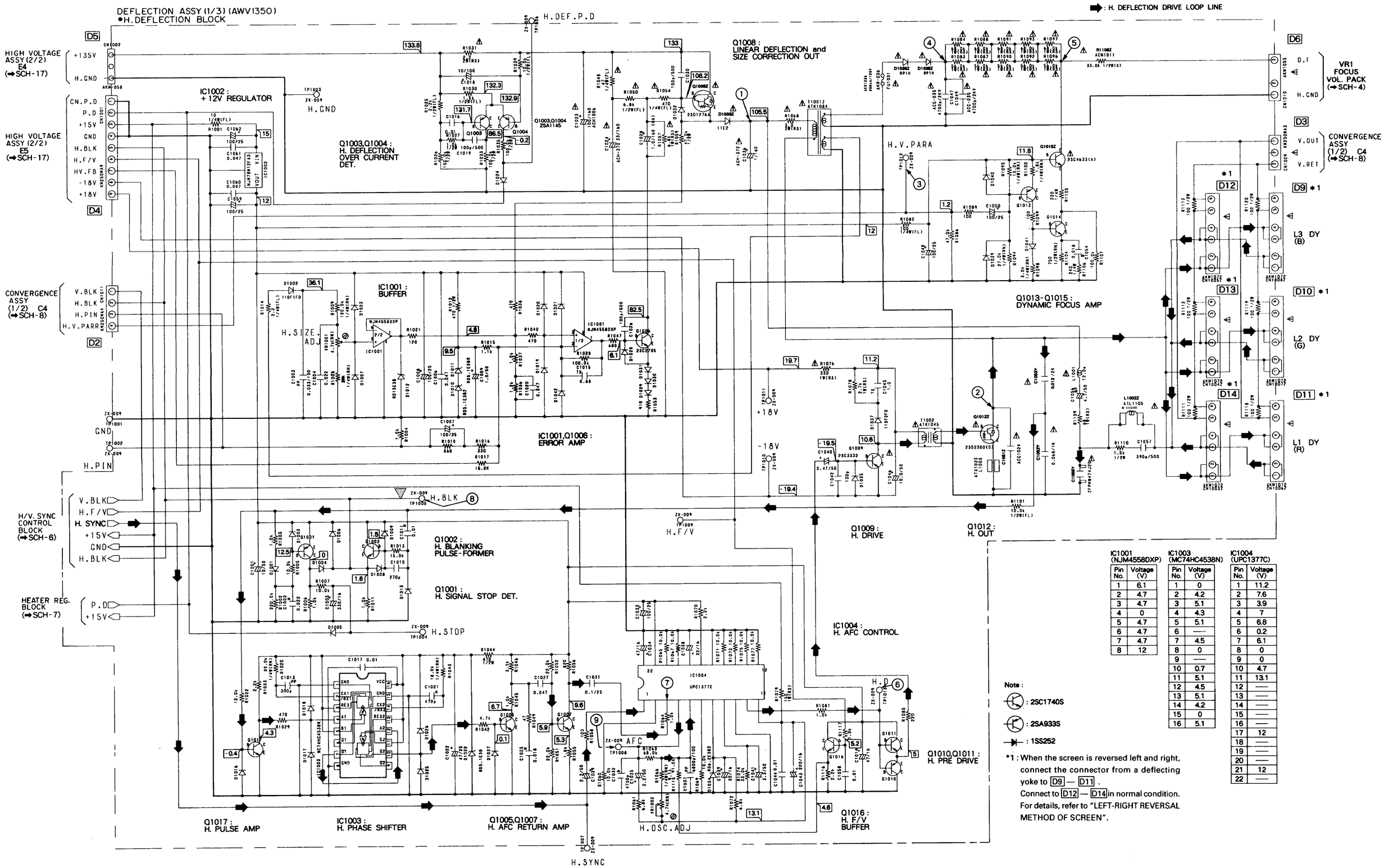
(13) TP6505 (HD. OUT)
V Range : 5V/div.
H Range : 20 μ sec/div.



(17) Q6501 Emitter
(CLAMP PULSE)
V Range : 1V/div.
H Range : 20 μ sec/div.



5.6 DEFLECTION ASSY (1/3)



IC1001 (NJM4558DXP)	
Pin No.	Voltage (V)
1	6.1
2	4.7
3	4.7
4	0
5	4.7
6	4.7
7	4.7
8	12

IC1003 (MC74HC4538N)	
Pin No.	Voltage (V)
1	0
2	4.2
3	5.1
4	4.3
5	5.1
6	—
7	4.5
8	0
9	—
10	0.7
11	5.1
12	4.5
13	5.1
14	4.2
15	0
16	5.1

IC1004 (UPC1377C)	
Pin No.	Voltage (V)
1	11.2
2	7.6
3	3.9
4	7
5	6.8
6	0.2
7	6.1
8	0
9	0
10	4.7
11	13.1
12	—
13	—
14	—
15	—
16	—
17	12
18	—
19	—
20	—
21	12
22	—

Note :
- : 2SC1740S
- : 2SA933S
- : 1SS252

*1 : When the screen is reversed left and right, connect the connector from a deflecting yoke to D9 — D11 . Connect to D12 — D14 in normal condition. For details, refer to "LEFT-RIGHT REVERSAL METHOD OF SCREEN".

5.7 DEFLECTION ASSY (2/3)

DEFLECTIO ASSY (2/3) (AWV1350)
●H/V.SYNC CONTROL BLOCK

SCH-6

IC6501 (M52036SP)

Pin No.	Voltage (V)	Pin No.	Voltage (V)
1	0	11	1.1
2	0	12	0
3	4.9	13	0
4	4.9	14	0.8
5	0	15	10.8
6	6.3	16	12
7	6.2	17	0.2
8	6.3	18	0
9	6.2	19	0
10	5.2	20	3.4

IC6502 (UPC1377C)

Pin No.	Voltage (V)	Pin No.	Voltage (V)
1	3.5	12	0
2	0.2	13	0
3	2	14	0
4	8.3	15	0
5	0	16	0
6	12	17	3.9
7	0	18	7.4
8	1.4	19	5.2
9	0	20	0
10	11.6	21	12
11	12	22	8.5

IC6506 (NE555P)

Pin No.	Voltage (V)
1	0
2	8.3
3	9.4
4	12
5	8
6	3
7	3
8	12

IC6507 (NJM311D)

Pin No.	Voltage (V)
1	0
2	7.2
3	5.4
4	0
5	12
6	12
7	8
8	12

IC6508 (NJM311D)

Pin No.	Voltage (V)
1	0
2	8.2
3	—
4	0
5	12
6	12
7	10.2
8	12

H.DEFLECTION BLOCK (➡SCH-5)
+15V
H.BLK
GND

U-COM ASSY (1/2) A2 (➡SCH-2)
GND
15V
H.BLK
V.BLK
H.POS
V.POS
V.SYNC
H.SYNC
G.SYNC
CLP.P
H.F/V
CN6501
D1

IC6509 : +12V REGULATOR
Q6501 : BUFFER
Q6502-Q6505 : V. PULSE AMP
IC6503,IC6504 : V. PULSE PHASE SHIFT
Q6524 : INVERTER
Q6525 : BUFFER
Q6513-Q6515 : V. PULSE AMP
IC6505 : V. PULSE VARIABLE PHASE SHIFT & FORMER
IC6501 : SYNC SEPARATOR
Q6520,Q6521 : V. SYNC AMP
Q6522,Q6523 : BUFFER
IC6506 : H. PULSE PHASE SHIFT
Q6506-Q6509,Q6519 : V. PULSE AMP
Q6510,Q6511 : BUFFER
Q6516 : BUFFER
IC6502 : V. BLK OSC.
Q6512,Q6517,Q6518 : H. PULSE AMP
IC6507 : H. PULSE VARIABLE PHASE SHIFT
IC6508 : H. PULSE FORMER

Note :
: 2SC2458
: 2SA1048
: HSS104-02

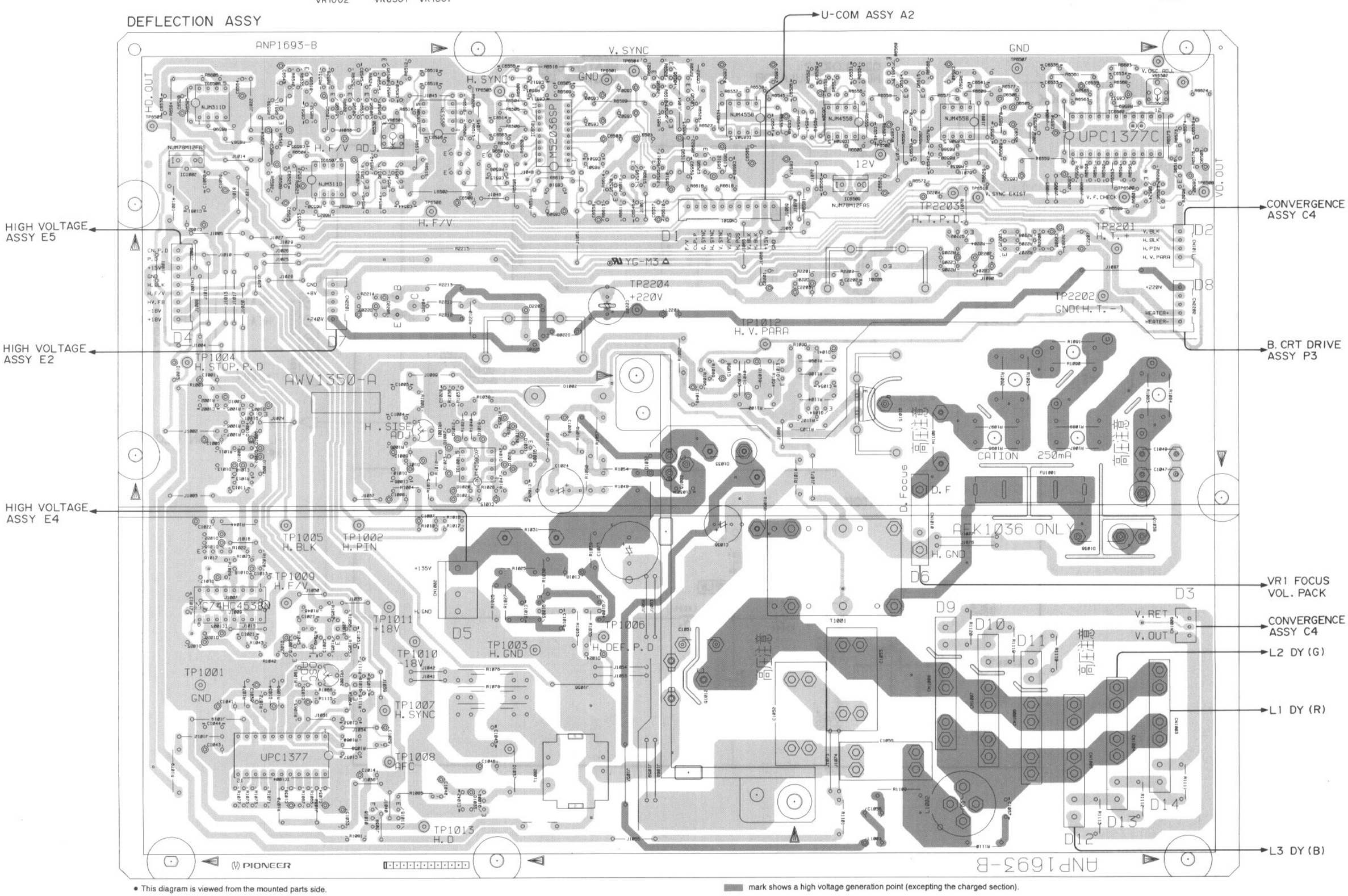
IC6506 (NE555P)
CONTROL VOLTAGE
RESET
OUTPUT
THRESHOLD
TRIGGER
FLIP-FLOP
GND
DISCHARGE

V.SYNC EXIST
V.f CHECK
VR6502 V.OSC ADJ.
VR6501 H.F/V ADJ.
VD OUT
V.BLK
H.DEFLECTION BLOCK (➡SCH-5)
H.F/V
H.SYNC
HD OUT
H.DEFLECTION BLOCK (➡SCH-5)
: H. DEFLECTION DRIVE LOOP LINE

PCB-3

IC1002 IC6508 IC1003 IC1004 IC6507 Q6506—Q6508 IC6506 IC1001 IC6501 IC6503 IC6504 IC6505 IC6502
Q6511 Q6510 Q6519 Q6509 Q2205 Q6520—Q6522 Q6523 IC6509
Q1017 Q1001 Q1007 Q6518 Q6517 Q6512 Q6501 Q1006 Q6502—Q6505 Q1013 Q1014 Q6513 Q6515 Q2202 Q2203 Q6516
Q1002 Q1005 Q1016 Q1010 Q1011 Q2204 Q1009 Q1003 Q1004 Q1008 Q1012 Q1015 Q2201 Q6524 Q6525
VR1002 VR6501 VR1001 VR6502

DEFLECTION ASSY



• This diagram is viewed from the mounted parts side.

mark shows a high voltage generation point (excepting the charged section).

DEFLECTION (3/3) (AWV1350)
•HEATER REG. BLOCK

SCH-7

+15V
H. DEFLECTION BLOCK
(➡SCH-5)

Q2201,Q2202 :
HEATER REGULATOR

Q2203 :
HEATER UPPER
VOLTAGE DET.

HEATER+

HIGH VOLTAGE
ASSY (2/2)
E2
(➡SCH-17)

GND
+8V
+240V

B. CRT DRIVE
ASSY P3
(➡SCH-4)

HEATER-
HEATER+
+220V

P.D

H. DEFLECTION BLOCK
(➡SCH-5)

GND

Q2204,Q2205 :
+ 220V REGULATOR

+220V

DEFLECTION ASSY (3/3) SCH-7

5.9 CONVERGENCE ASSY (1/2)

SCH－8

CONVERGENCE ASSY(1/2) (AWV1516)
●CONVERGENCE BLOCK

IC2503 (PA0053A)

Pin No.	Voltage (V)	Pin No.	Voltage (V)
1	0.43	10	－0.06
2	1.03	11	0.43
3	5	12	－0.73
4	－0.11	13	0.37
5	－0.83	14	1.18
6	－0.13	15	0
7	－0.88	16	－1.77
8	－0.13	17	1.16
9	－4.9	18	－1.57

IC2504 (PA0053A)

Pin No.	Voltage (V)	Pin No.	Voltage (V)
1	0.28	10	0.12
2	1.2	11	0.39
3	5	12	－0.98
4	0.02	13	0.29
5	－0.92	14	1.17
6	－0.29	15	0
7	－0.93	16	－2.06
8	－0.01	17	1.2
9	－4.9	18	－1.46

IC2510 (STK392-020)

Pin No.	Voltage (V)	Pin No.	Voltage (V)
1	NC	12	－19
2	NC	13	－19
3	NC	14	19
4	0	15	19
5	0	16	－19
6	0	17	－19
7	0	18	19
8	0	19	－19
9	0	20	0.1
10	0	21	0.08
11	19	22	0.16

IC2511 (STK392-020)

Pin No.	Voltage (V)	Pin No.	Voltage (V)
1	NC	12	－19
2	NC	13	－19
3	NC	14	19
4	0	15	19
5	0	16	－19
6	0	17	－19
7	0	18	19
8	0	19	－19
9	0	20	0.31
10	0	21	0.07
11	19	22	－0.27

HIGH VOLTAGE ASSY (2/2) E3 (➡SCH-17)

V. DEFLECTION (➡SCH-9)

DEFLECTION ASSY(1/3) (➡SCH-5)

V. DEFLECTION BLOCK (➡SCH-9)

U-COM ASSY (2/2) A4 (➡SCH-3)

Non connection

Non Connection

Q2501,Q2503 : OVER CURRENT DET.

IC2503,IC2504 : CONVERGENCE CORRECTION SIGNAL GENERATOR

(+5V REGULATOR)

(－5V REGULATOR)

D2517－D2522 RD12ESB

D2528－D2533 RD12ESB

D2558－D2560 RD12ESB

IC2508 (1/2) : HV. PARA BUFFER

IC2508 (2/2) : H. PIN BUFFER

IC2509 (2/2) : V. DEF BUFFER

IC2512 SN74LS74AN

Q2502 : INVERTER BUFFER

IC2509,IC2512,Q2504 : INTERLACE SIGNAL GENERATOR

コンバーGH ASSY CN4200－CN4202 (➡SCH－10)

コンバーH1 ASSY CN4230－CN4232 (➡SCH－11)

コンバーH2 ASSY CN4260－CN4262 (➡SCH－12)

コンバーV1 ASSY CN4290－CN4292 (➡SCH－13)

コンバーV2 ASSY CN4320－CN4322 (➡SCH－14)

コンバーV3 ASSY CN4350－CN4352 (➡SCH－15)

GH.MODULE　RH.MODULE　BH.MODULE　GV.MODULE　RV.MODULE　BV.MODULE

IC2510,IC2511 : CONVERGENCE－YOKE DRIVE AMP

(GH BUFFER)　(RH BUFFER)　(BH BUFFER)

(GV BUFFER)　(RV BUFFER)　(BV BUFFER)

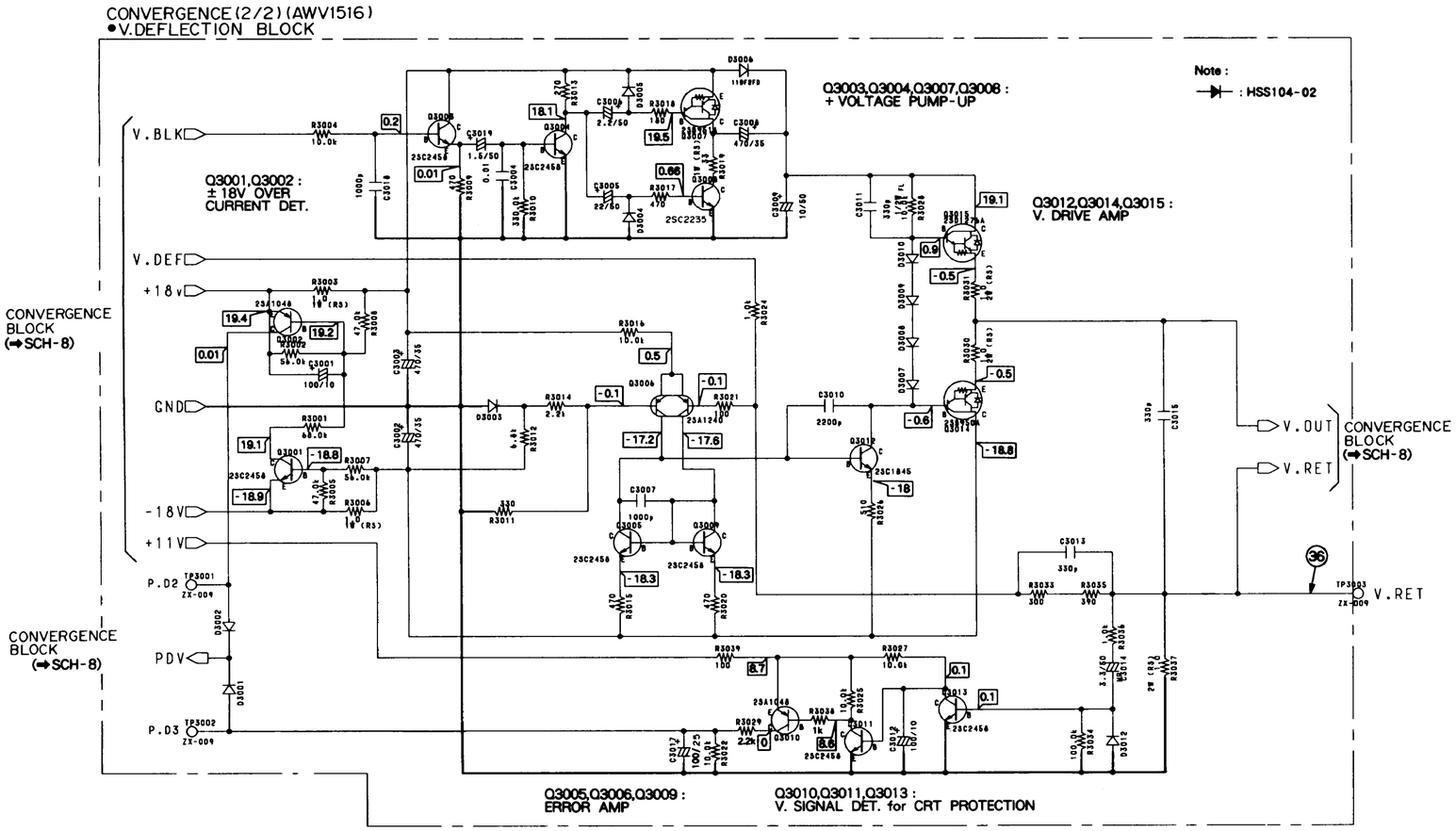
S2501

Note :
HSS104－02

CONVERGENCE ASSY (1/2)

SCH-8

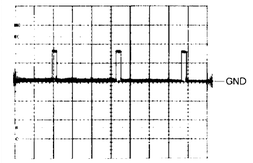
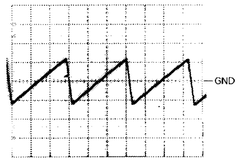
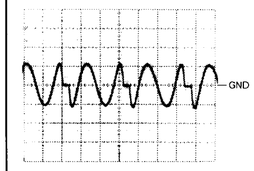
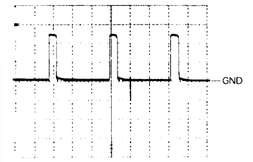
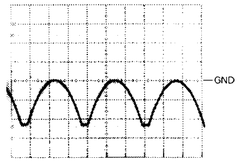
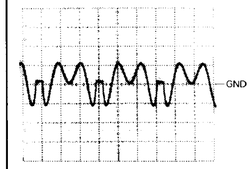
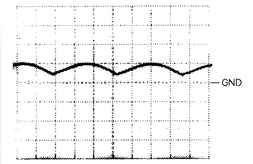
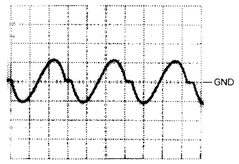
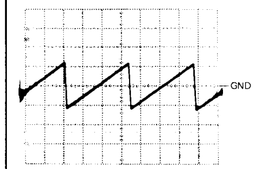
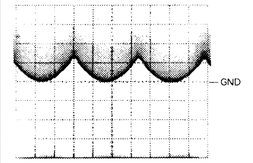
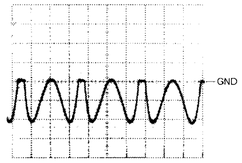
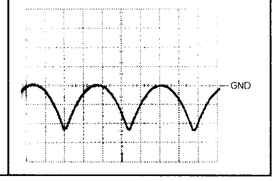
5.10 CONVERGENCE ASSY (2/2)



SCH-9

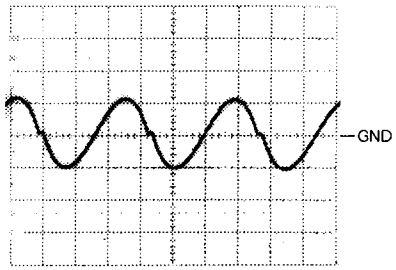
• WAVEFORMS for CONVERGENCE ASSY

• Input signal : Color bar (NTSC)
• Condition : Service mode (Set S5502 in U-COM ASSY to SERVICE)

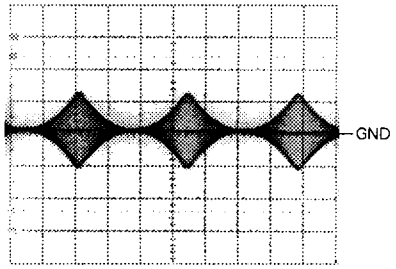
① CONNECTOR C4 Pin4 (V. BLK) V Range : 1V/div. H Range : 5msec/div. 	⑤ IC2503 Pin4 V Range : 1V/div. H Range : 20 μ sec/div. 	⑨ IC2503 Pin8 V Range : 1V/div. H Range : 20 μ sec/div. 
② CONNECTOR C4 Pin5 (H. BLK) V Range : 1V/div. H Range : 5msec/div. 	⑥ IC2503 Pin5 V Range : 1V/div. H Range : 20 μ sec/div. 	⑩ IC2503 Pin10 V Range : 1V/div. H Range : 20 μ sec/div. 
③ CONNECTOR C4 Pin6 (H. PIN) V Range : 1V/div. H Range : 5msec/div. 	⑦ IC2503 Pin6 V Range : 1V/div. H Range : 20 μ sec/div. 	⑪ IC2504 Pin4 V Range : 1V/div. H Range : 5msec/div. 
④ CONNECTOR C4 Pin7 (HV. PARA) V Range : 1V/div. H Range : 5msec/div. 	⑧ IC2503 Pin7 V Range : 1V/div. H Range : 20 μ sec/div. 	⑫ IC2504 Pin5 V Range : 1V/div. H Range : 5msec/div. 

CONVERGENCE ASSY (2/2)
SCH-9

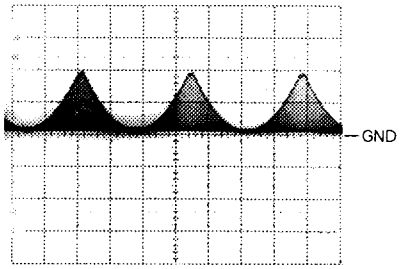
(13) IC2504 Pin6
V Range : 1V/div.
H Range : 5msec/div.



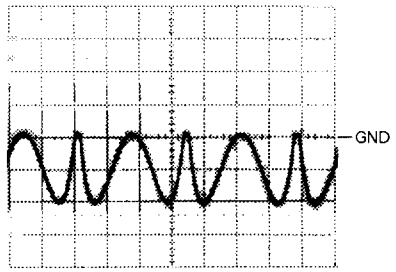
(17) CONNECTOR for GH Pin11
V Range : 1V/div.
H Range : 5msec/div.



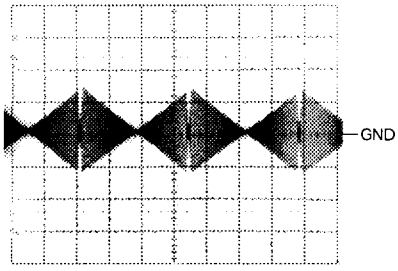
(21) CONNECTOR for RV Pin11
V Range : 1V/div.
H Range : 5msec/div.



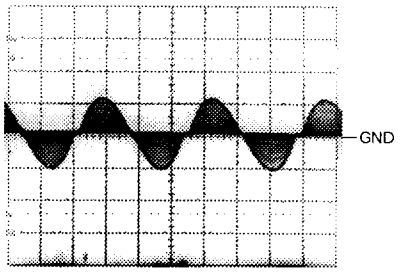
(14) IC2504 Pin7
V Range : 1V/div.
H Range : 5msec/div.



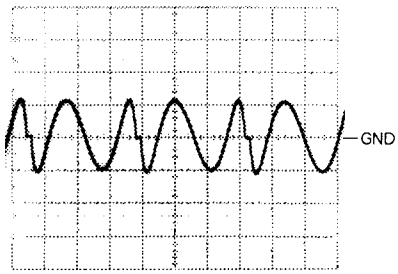
(18) CONNECTOR for RH Pin11
V Range : 1V/div.
H Range : 5msec/div.



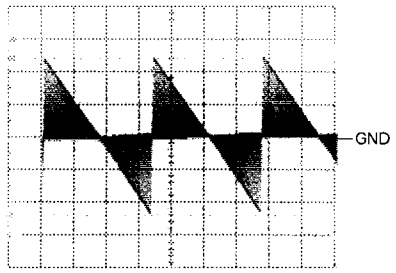
(22) CONNECTOR for BV Pin11
V Range : 1V/div.
H Range : 5msec/div.



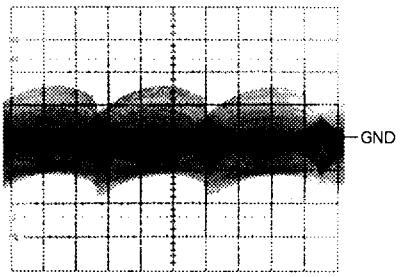
(15) IC2504 Pin8
V Range : 1V/div.
H Range : 5msec/div.



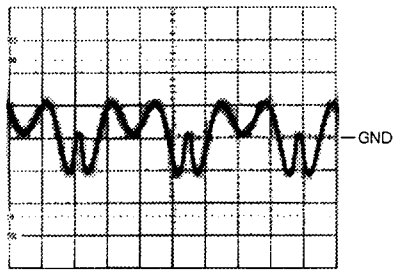
(19) CONNECTOR for BH Pin11
V Range : 1V/div.
H Range : 5msec/div.



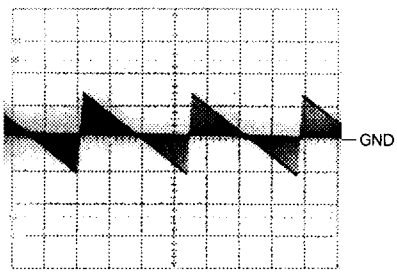
(23) TP2508 (GH)
V Range : 0.1V/div.
H Range : 5msec/div.



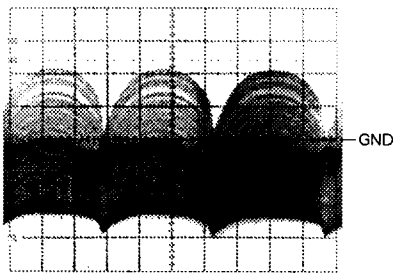
(16) IC2504 Pin10
V Range : 1V/div.
H Range : 5msec/div.



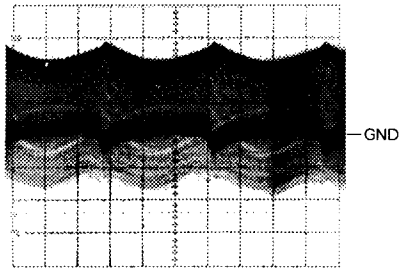
(20) CONNECTOR for GV Pin11
V Range : 1V/div.
H Range : 5msec/div.



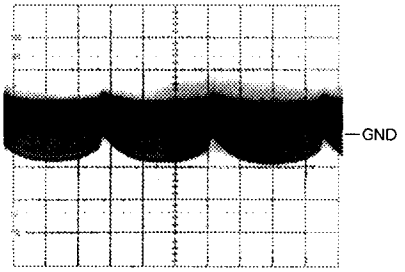
(24) TP2509 (RH)
V Range : 0.1V/div.
H Range : 5msec/div.



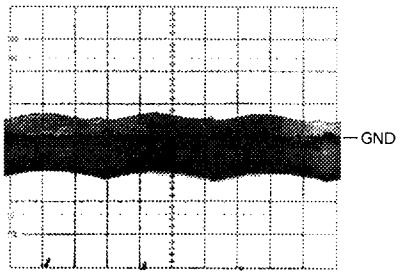
(25) TP2510 (BH)
V Range : 0.1V/div.
H Range : 5msec/div.



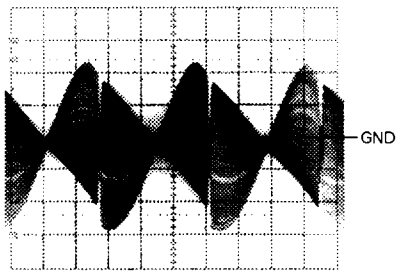
(29) CONNECTOR CN2508 Pin6
V Range : 0.5V/div.
H Range : 5msec/div.



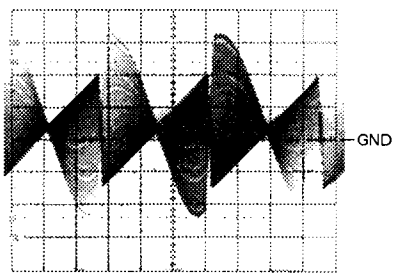
(33) CONNECTOR CN2508 Pin2
V Range : 0.5V/div.
H Range : 5msec/div.



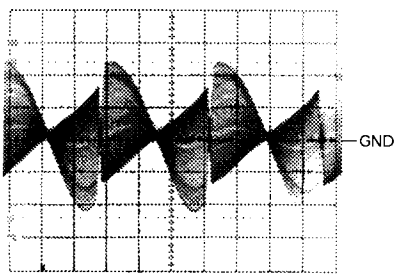
(26) TP2511 (GV)
V Range : 0.2V/div.
H Range : 5msec/div.



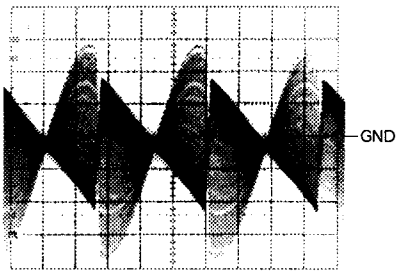
(30) CONNECTOR C6 Pin2
V Rang : 0.5V/div.
H Range : 5msec/div.



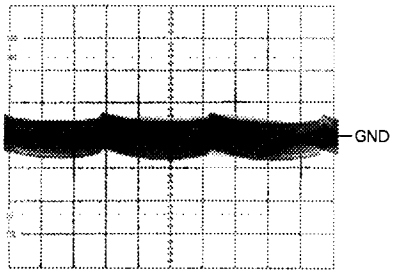
(34) CONNECTOR C8 Pin2
V Range : 0.5V/div.
H Range : 5msec/div.



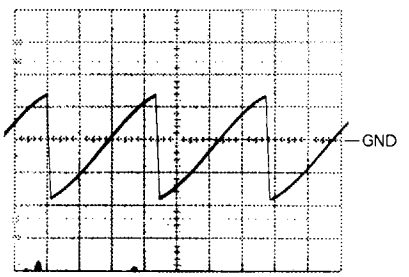
(27) TP2512 (RV)
V Range : 0.2V/div.
H Range : 5msec/div.



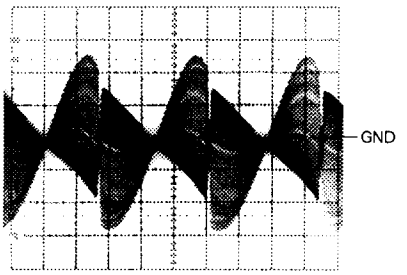
(31) CONNECTOR CN2508 Pin4
V Range : 0.5V/div.
H Range : 5msec/div.



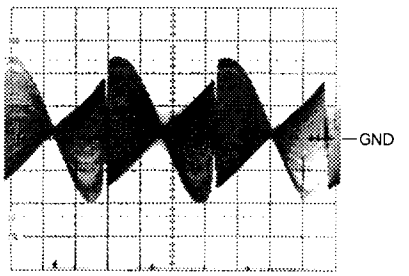
(35) IC2509 Pin7
V Range : 1V/div.
H Range : 5msec/div.



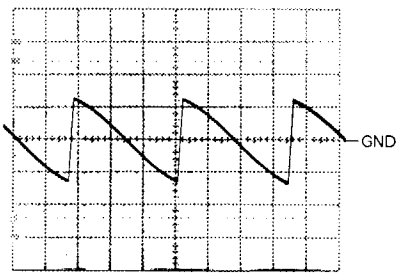
(28) TP2513 (BV)
V Range : 0.2V/div.
H Range : 5msec/div.



(32) CONNECTOR C7 Pin2
V Range : 0.5V/div.
H Range : 5msec/div.



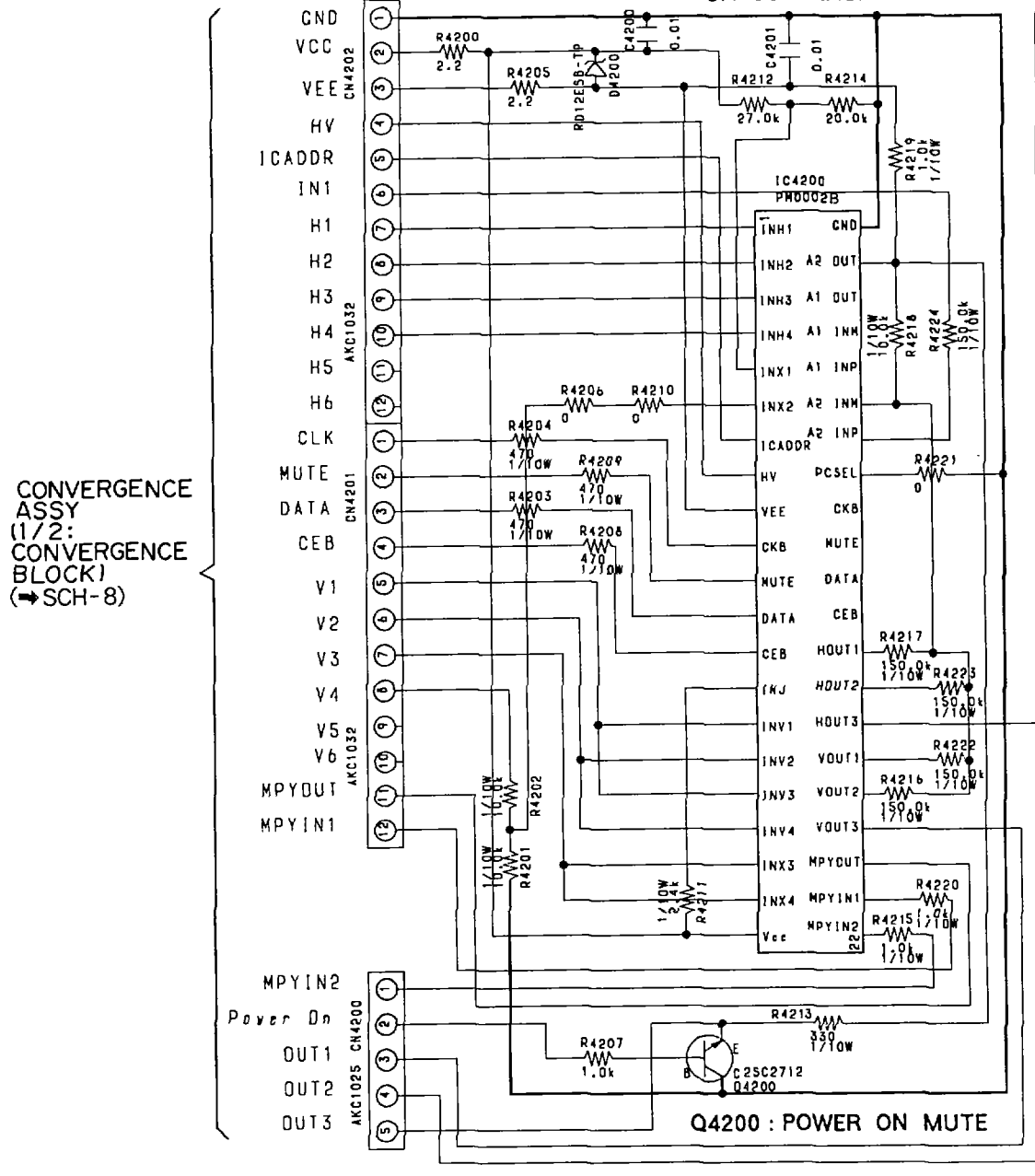
(36) TP3003 (V. RET)
(2/2 In : V. DEFLECTION Block)
V Range : 1V/div.
H Range : 5msec/div.



5.11 CONVERGENCE GH ASSY

SCH-10

CONVERGENCE GH ASSY (AWZ4500)



IC4200 (PM0002A)

Pin No.	Voltage (V)	Pin No.	Voltage (V)
1	0.01	22	0
2	-0.97	23	0
3	0.03	24	0
4	-0.94	25	1.5
5	3.7	26	0
6	-0.5	27	0
7	0	28	0.3
8	5	29	0.1
9	-4.8	30	0.3
10	-	31	N.C.
11	-	32	N.C.
12	-	33	N.C.
13	-	34	N.C.
14	1.9	35	0
15	-0.05	36	-
16	-0.82	37	-
17	-0.05	38	0
18	-0.82	39	0
19	0.08	40	-2
20	0.08	41	0
21	5	42	0

5.12 CONVERGENCE H1 ASSY

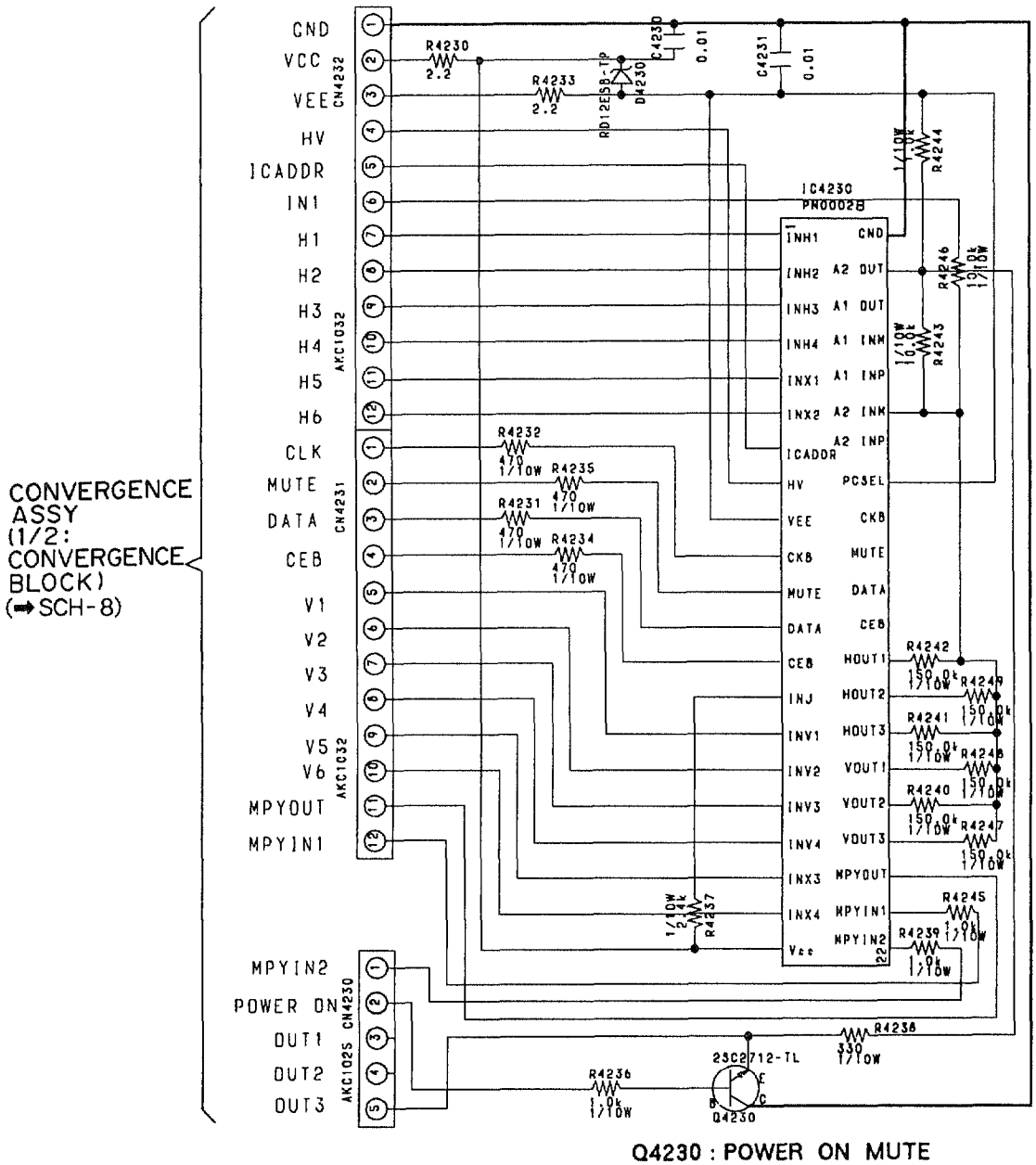
SCH-11

CONVERGENCE H1 ASSY (AWZ4501)

IC4230 :
D/A CONVERTER
FOR CONVERGENCE

IC4230 (PM0002A)

Pin No.	Voltage (V)	Pin No.	Voltage (V)
1	0.01	22	0
2	-0.97	23	0
3	-0.03	24	0
4	-0.94	25	0
5	-0.03	26	0
6	0.14	27	0
7	5	28	0
8	5	29	0
9	-4.8	30	0.3
10	-	31	N.C.
11	-	32	N.C.
12	-	33	N.C.
13	-	34	N.C.
14	1.9	35	-4.8
15	-0.05	36	N.C.
16	-0.82	37	-
17	0.08	38	0
18	-1.1	39	0
19	0.05	40	-1.7
20	0.15	41	-0.1
21	-	42	0



Q4230 : POWER ON MUTE

CONVERGENCE H1 ASSY

SCH-11

5.13 CONVERGENCE H2 ASSY

SCH-12

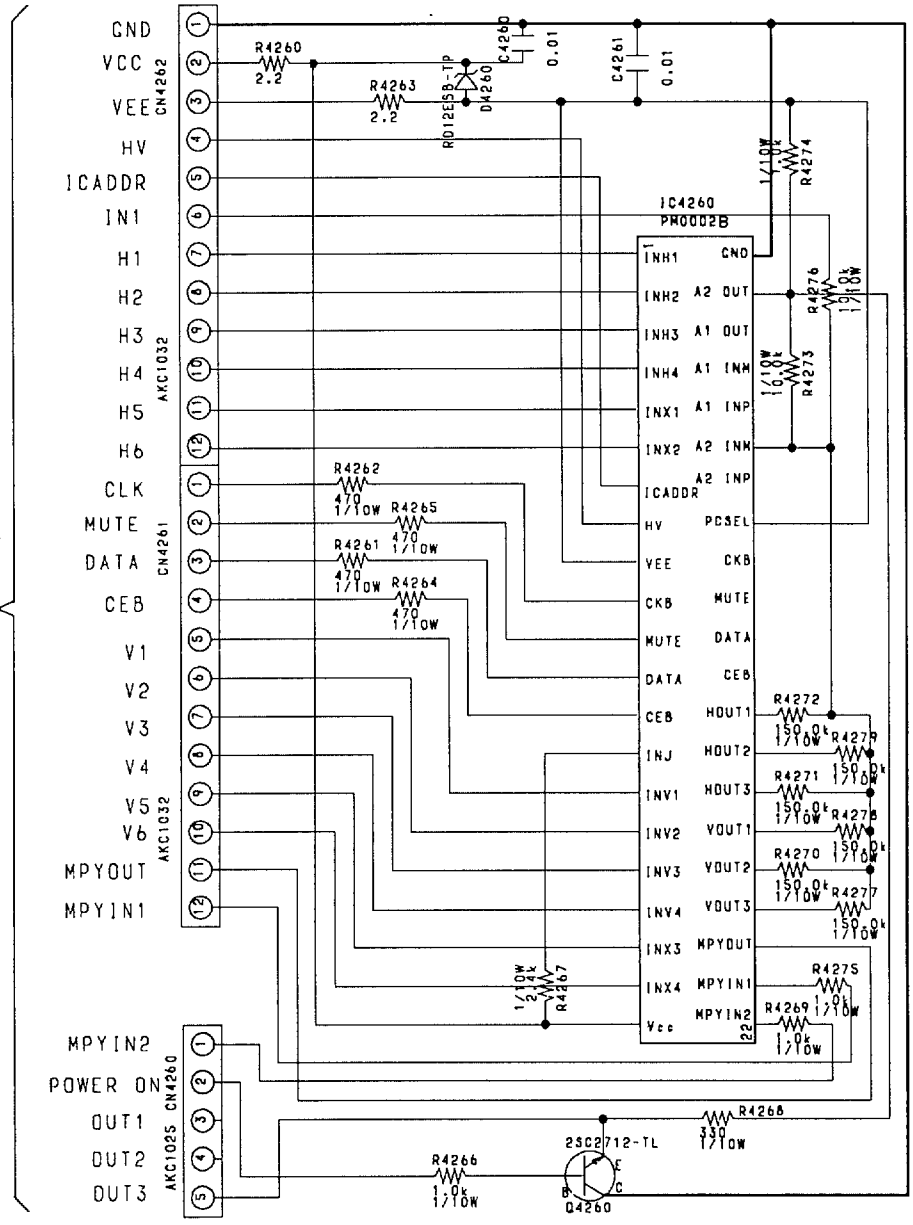
CONVERGENCE H2 ASSY (AWZ4502)

IC4260 :
D/A CONVERTER
FOR CONVERGENCE

IC4260 (PM0002A)

Pin No.	Voltage (V)	Pin No.	Voltage (V)
1	0.01	22	-0.4
2	-0.97	23	0
3	-0.02	24	0
4	-0.94	25	0
5	-0.03	26	0
6	0.14	27	0
7	-4.9	28	0
8	5	29	0.3
9	-4.8	30	0.3
10	-	31	N.C.
11	-	32	N.C.
12	-	33	N.C.
13	-	34	N.C.
14	1.9	35	-4.8
15	-0.05	36	N.C.
16	-0.82	37	-
17	0.08	38	0
18	-1.1	39	0
19	0.05	40	-1.4
20	0.15	41	0
21	5	42	0

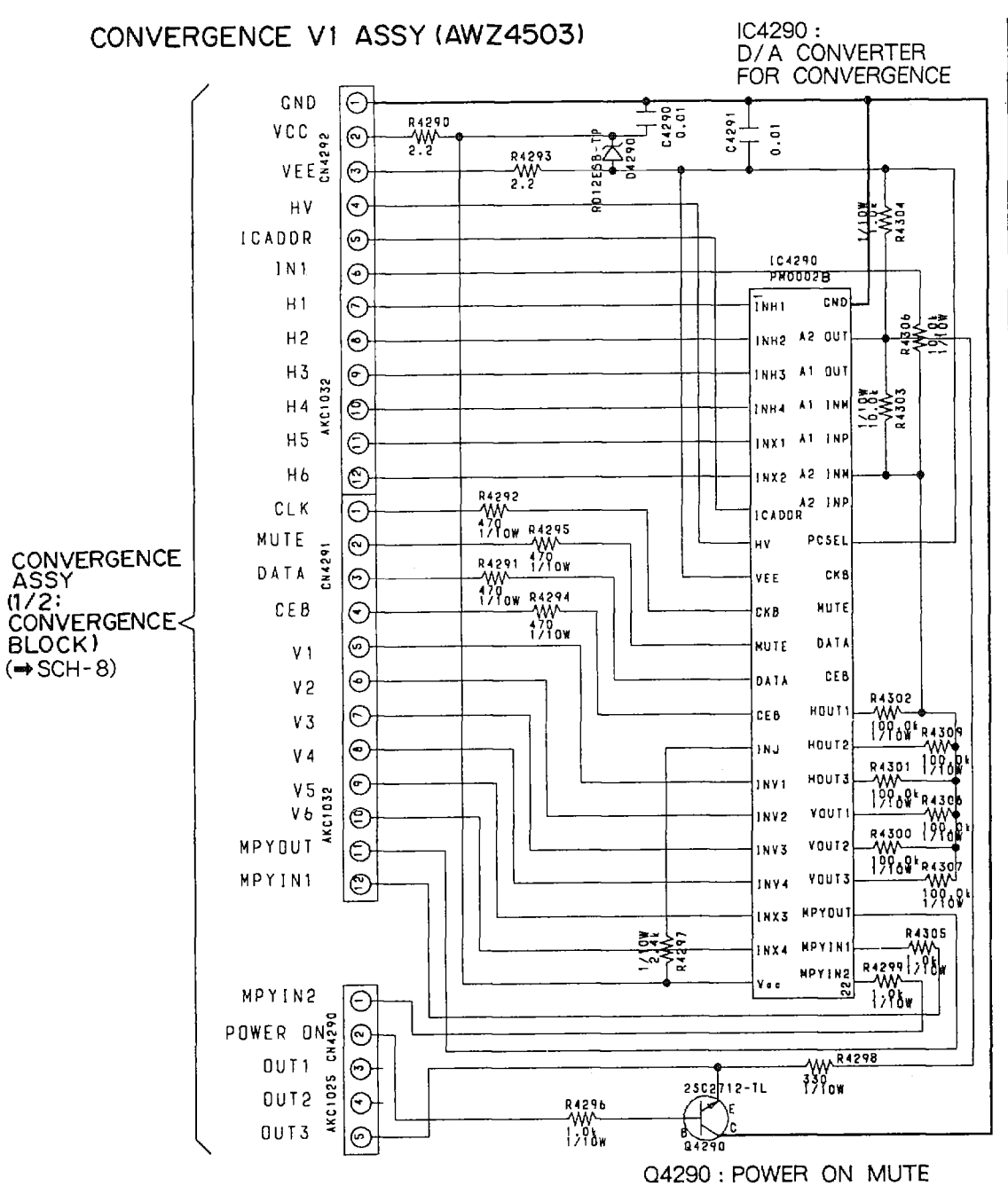
CONVERGENCE ASSY (1/2: CONVERGENCE BLOCK) (➡SCH-8)



Q4260 : POWER ON MUTE

5.14 CONVERGENCE V1 ASSY

SCH-13



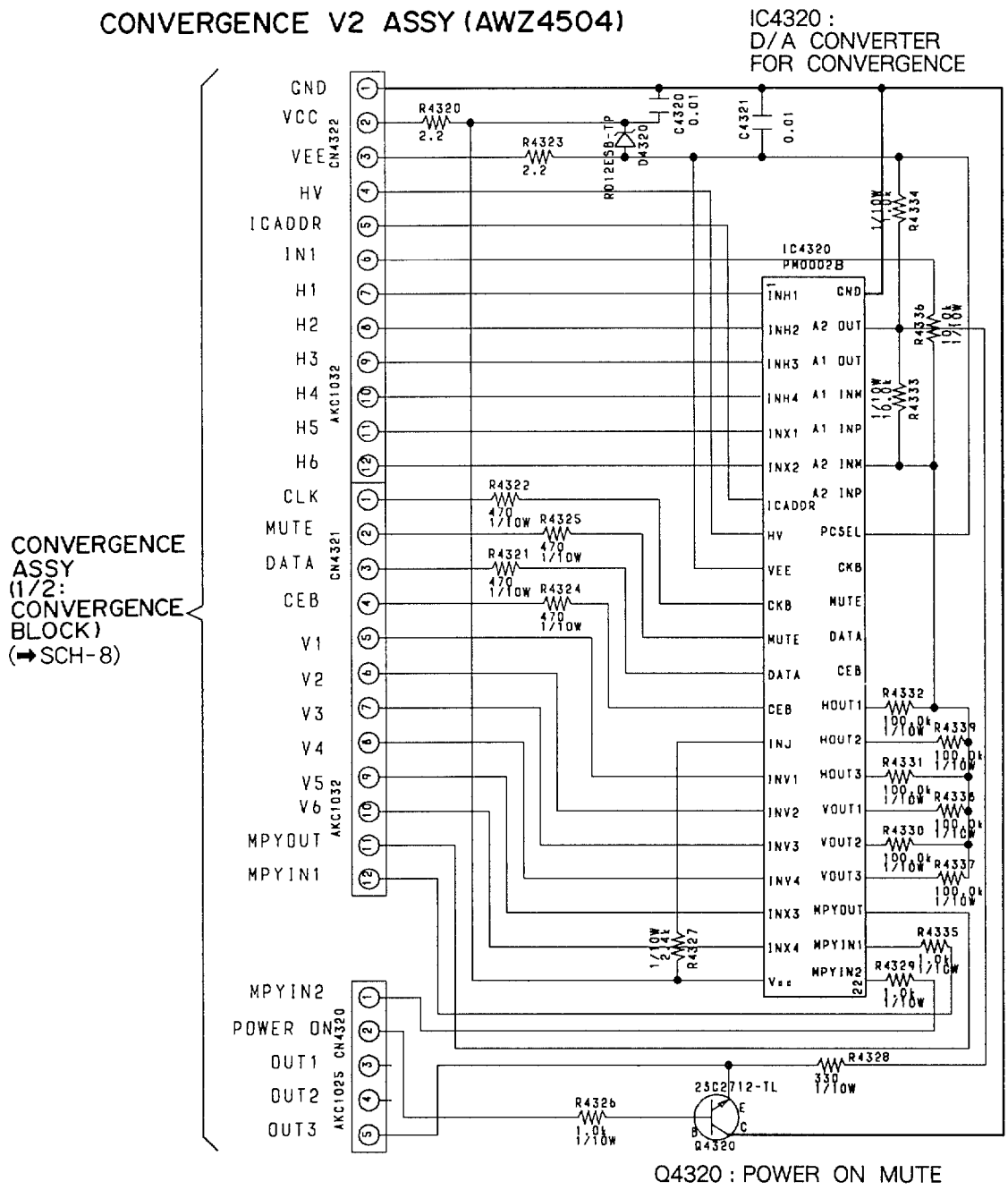
IC4290 (PM0002A)

Pin No.	Voltage (V)	Pin No.	Voltage (V)
1	0.01	22	-0.5
2	-0.97	23	-0.4
3	-0.02	24	0.3
4	-0.94	25	-0.2
5	-0.03	26	0
6	0.14	27	0
7	0	28	0
8	0	29	0.1
9	-4.8	30	0.1
10	-	31	N.C.
11	-	32	N.C.
12	-	33	N.C.
13	-	34	N.C.
14	1.9	35	-4.8
15	-0.05	36	N.C.
16	-0.82	37	-
17	-0.05	38	0
18	-0.82	39	0
19	0.08	40	-1.1
20	0.08	41	0
21	5	42	0

5.15 CONVERGENCE V2 ASSY

SCH-14

CONVERGENCE V2 ASSY (AWZ4504)



Q4320 : POWER ON MUTE

IC4320 (PM0002A)

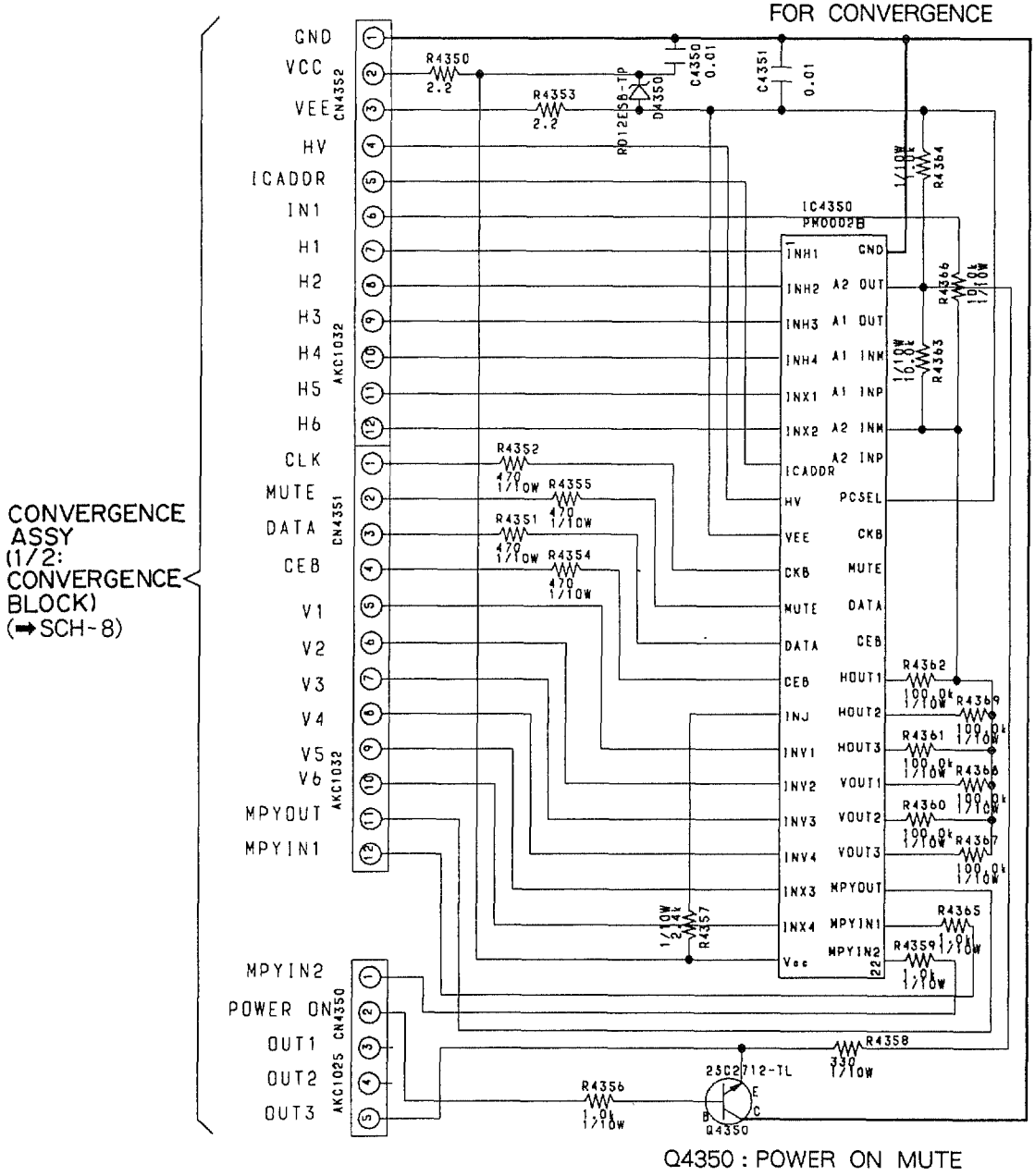
Pin No.	Voltage (V)	Pin No.	Voltage (V)
1	0.01	22	0
2	-0.97	23	0
3	-0.02	24	0
4	-0.94	25	-0.2
5	-0.03	26	0
6	0.14	27	0
7	5	28	0
8	0	29	0.1
9	-4.9	30	0
10	-	31	N.C.
11	-	32	N.C.
12	-	33	N.C.
13	-	34	N.C.
14	1.9	35	-4.8
15	-0.05	36	N.C.
16	-0.82	37	-
17	-0.05	38	0
18	-0.82	39	0
19	0.08	40	-1.4
20	0.08	41	0
21	5	42	0

5.16 CONVERGENCE V3 ASSY

SCH-15

CONVERGENCE V3 ASSY (AWZ4505)

IC4350 :
D/A CONVERTER
FOR CONVERGENCE



Q4350 : POWER ON MUTE

IC4350 (PM0002A)

Pin No.	Voltage (V)	Pin No.	Voltage (V)
1	0.01	22	0
2	-0.97	23	-0.4
3	-0.02	24	0
4	-0.94	25	-0.2
5	-0.03	26	0
6	0.14	27	0
7	-4.9	28	0
8	0	29	0.1
9	-4.8	30	0
10	-	31	N.C.
11	-	32	N.C.
12	-	33	N.C.
13	-	34	N.C.
14	1.9	35	-4.8
15	-0.05	36	N.C.
16	-0.82	37	-
17	-0.05	38	0
18	0.08	39	0
19	0.08	40	-1.8
20	5	41	0
21	-	42	0

CONVERGENCE ASSY

PCB-4

Q3007
Q3001
Q3004
Q2501
Q3008
Q2503
Q3014
IC2510 Q3015
IC2511
Q3012
Q3005
Q3006
Q3009
IC2509
IC2512 Q2504
IC2505
IC2506
IC2507
IC2501
IC2503
Q3010
IC2502
IC2504 Q3011
IC2508
Q2502

GH RH BH GV RV BV
TP2508 TP2509 TP2510 TP2511 TP2512 TP2513
TP2502 GND

P.D2 TP3001
P.D1 TP2501
C3

HIGH VOLTAGE ASSY
E3

NORMAL
REVERSE

L1 DY (RCY)
L2 DY (GCY)
L3 DY (BCY)

DEFLECTION ASSY
D3

DELECTION ASSY
D2

U-COM ASSY
A4

ANP1695-A
AWV1352-A
YG-M3 Δ

● This diagram is viewed from the mounted parts side.

ANP1586-C

CONVERGENCE GH ASSY
AWZ4500
PM0002A
GHV

CONVERGENCE H2 ASSY
AWZ4502
PM0002A

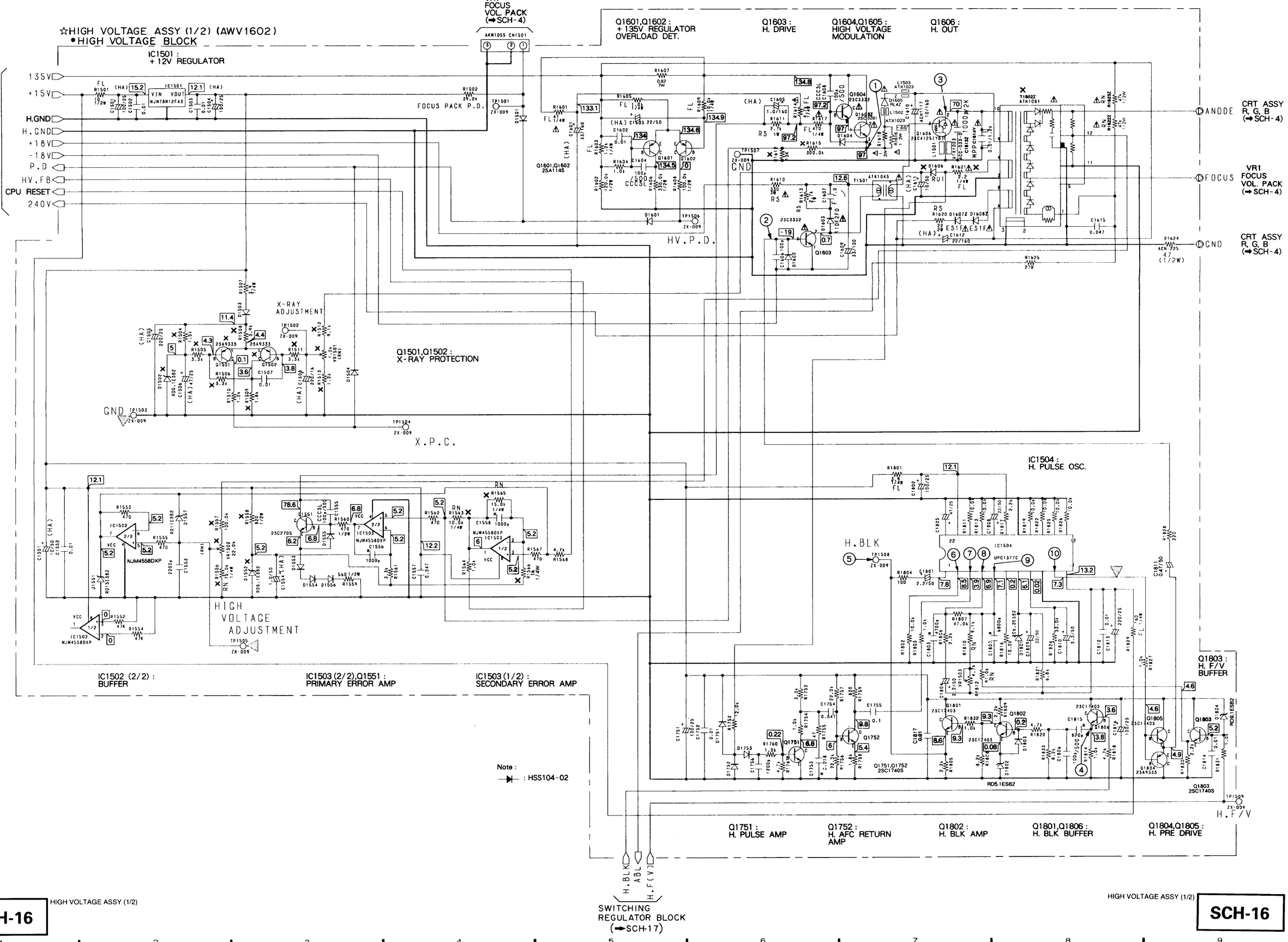
CONVERGENCE V2 ASSY
AWZ4504
PM0002A

CONVERGENCE H1 ASSY
AWZ4501
1279-A
PM0002A

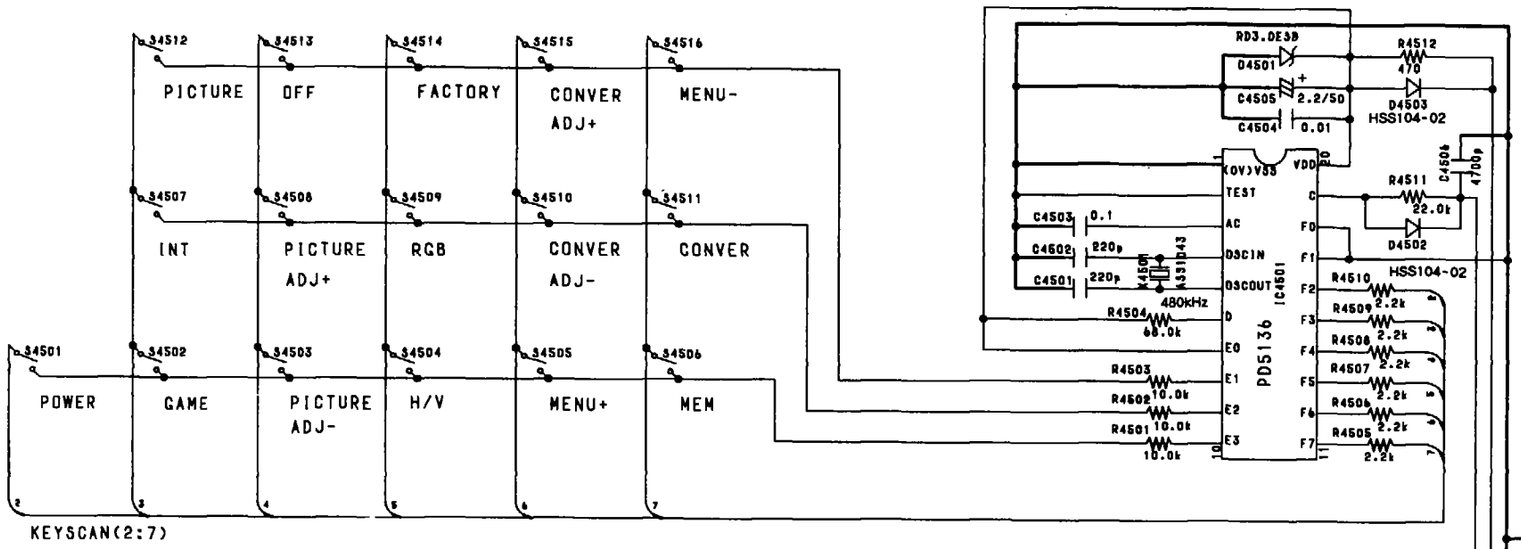
CONVERGENCE V1 ASSY
AWZ4503
PM0002A

CONVERGENCE V3 ASSY
AWZ4505
PM0002A

5.17 HIGH VOLTAGE ASSY (1/2)



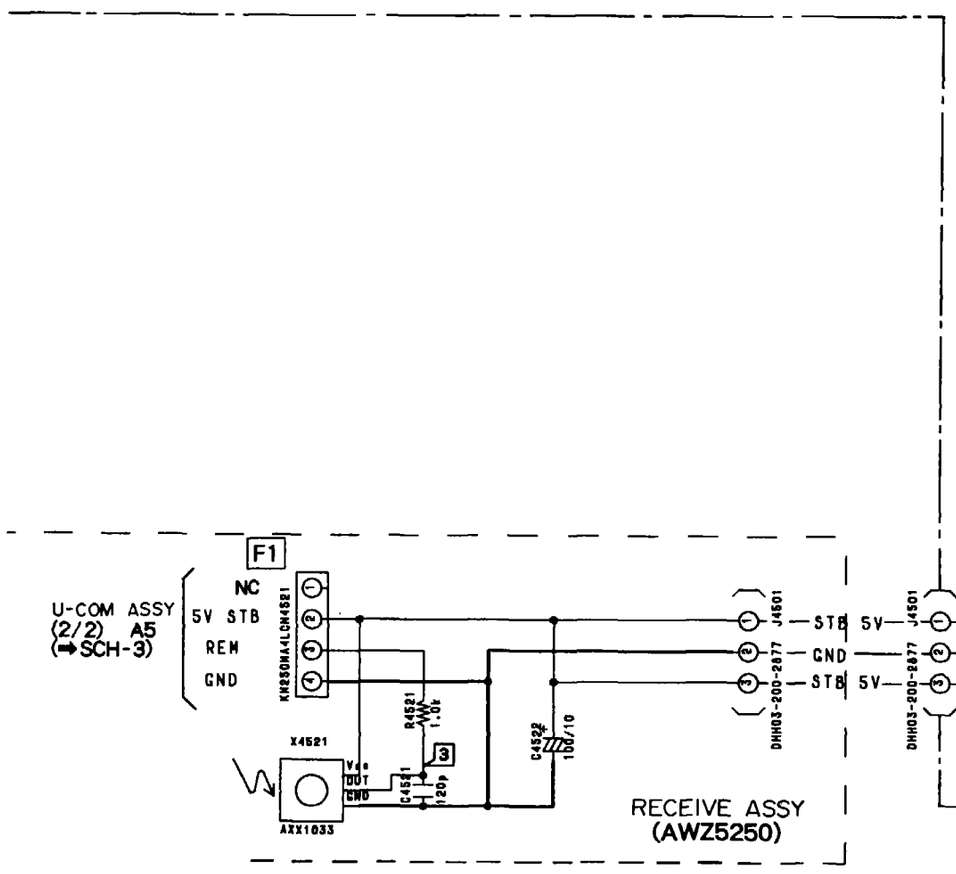
5.19 FRONT CONTROL ASSY, RECEIVE ASSY

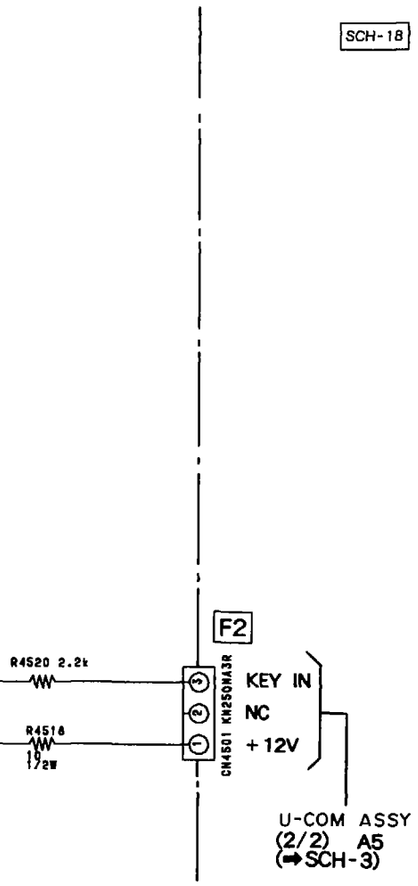


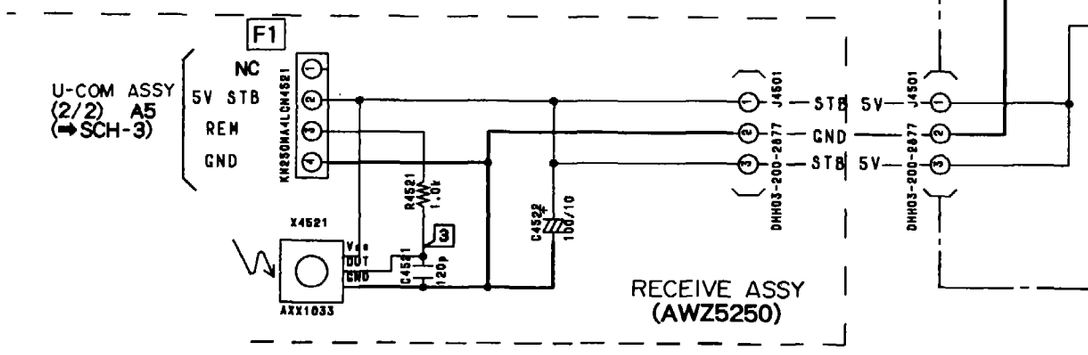
IC4501 :
KEY INPUT
MICROCOMPUTER

IC4501
(PD5136)

Pin No.	Voltage (V)	Pin No.	Voltage (V)
1	0	11	0
2	0	12	0
3	3	13	0
4	0	14	0
5	3	15	0
6	0	16	0
7	3	17	0
8	3	18	0
9	3	19	0
10	3	20	3



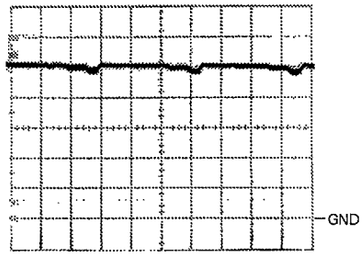




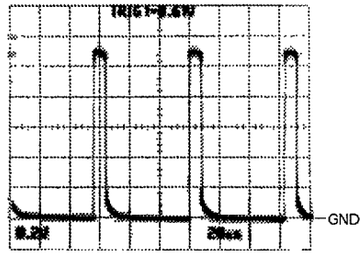
• WAVEFORMS for HIGH VOLTAGE ASSY (1/2)

• Input signal : Color bar (NTSC)
• Condition : Service mode (Set S5502 in U-COM ASSY to SERVICE)

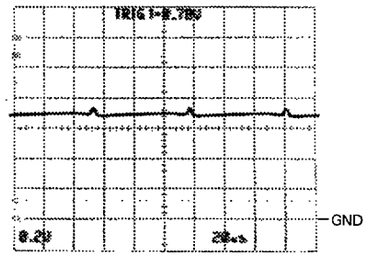
1 Q1605 Emitter for TP1507 (GND)
V Range : 20V/div.
H Range : 5msec/div.



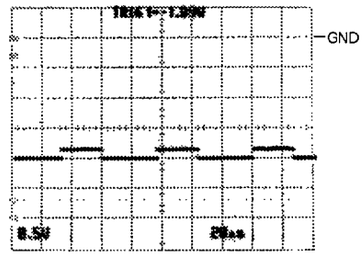
4 Q1806 Emitter TP1503 (GND)
V Range : 2V/div.
H Range : 20 μ sec/div.



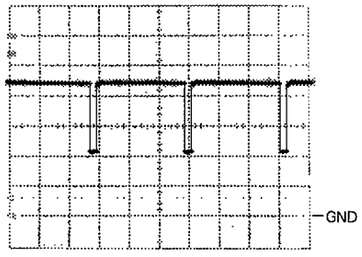
8 IC1504 Pin4 for TP1503 (GND)
V Range : 2V/div.
H Range : 20 μ sec/div.



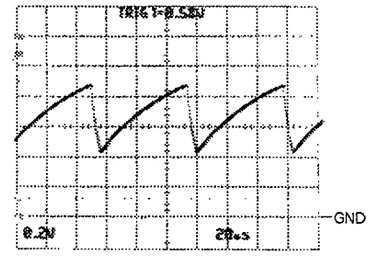
2 Q1603 Base for TP1507 (GND)
V Range : 5V/div.
H Range : 20 μ sec/div.



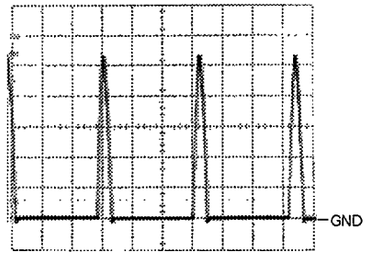
5 TP1508 (H. BLK) for TP1503 (GND)
V Range : 2V/div.
H Range : 20 μ sec/div.



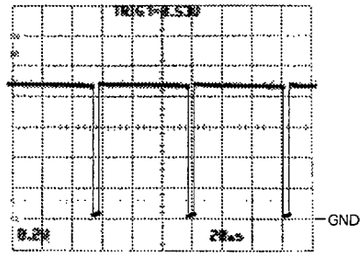
9 IC1504 Pin5 for TP1503 (GND)
V Range : 2V/div.
H Range : 20 μ sec/div.



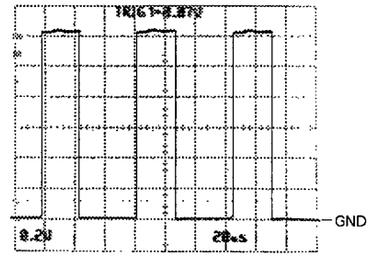
3 -1 Q1606 Collector for TP1507 (GND)
V Range : 200V/div.
H Range : 20 μ sec/div.



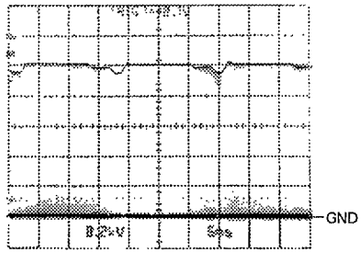
6 IC1504 Pin4 for TP1503 (GND)
V Range : 2V/div.
H Range : 20 μ sec/div.



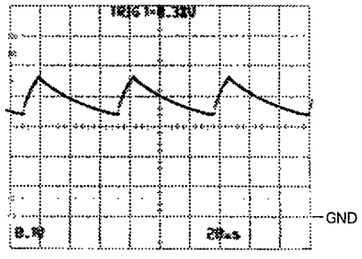
10 IC1504 Pin10 for TP1503 (GND)
V Range : 2V/div.
H Range : 20 μ sec/div.



3 -2 Q1606 Collector for TP1507 (GND)
V Range : 200V/div.
H Range : 5msec/div.



7 IC1504 Pin3 for TP1503 (GND)
V Range : 1V/div.
H Range : 20 μ sec/div.

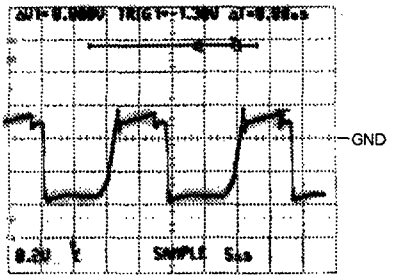


• WAVEFORMS

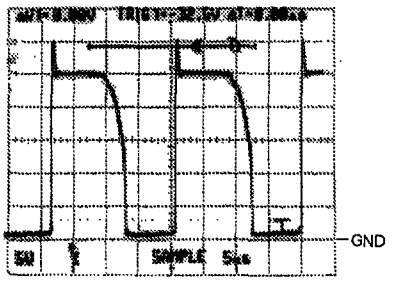
• Input signal : Color bar (NTSC)

• Condition : Service mode (Set S5502 in U-COM ASSY to SERVICE)

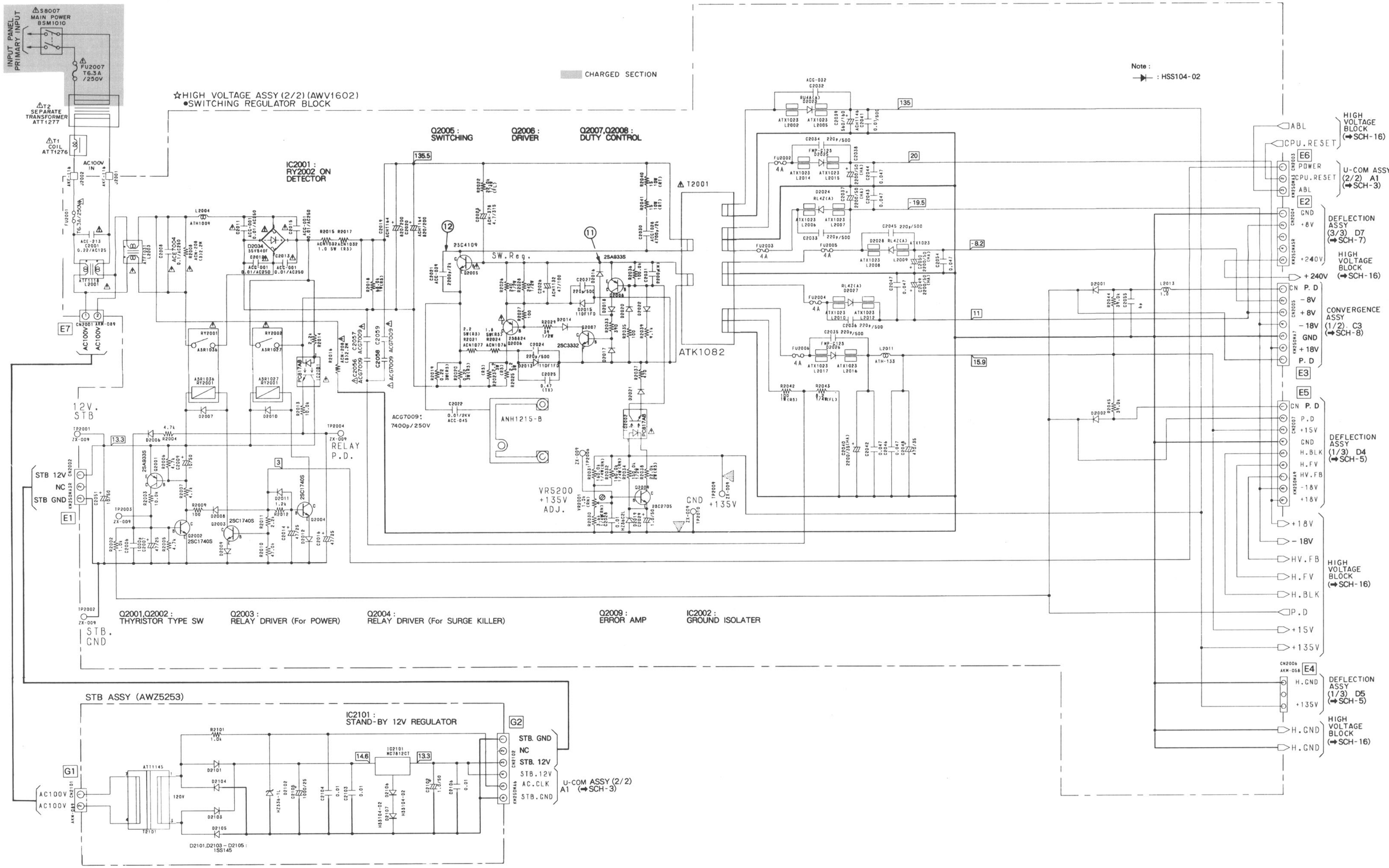
(11) Q2005 Base for GND
(GND : R2020 wire of R2041 side)
V Range : 2V/div.
H Range : 5 μ sec/div.

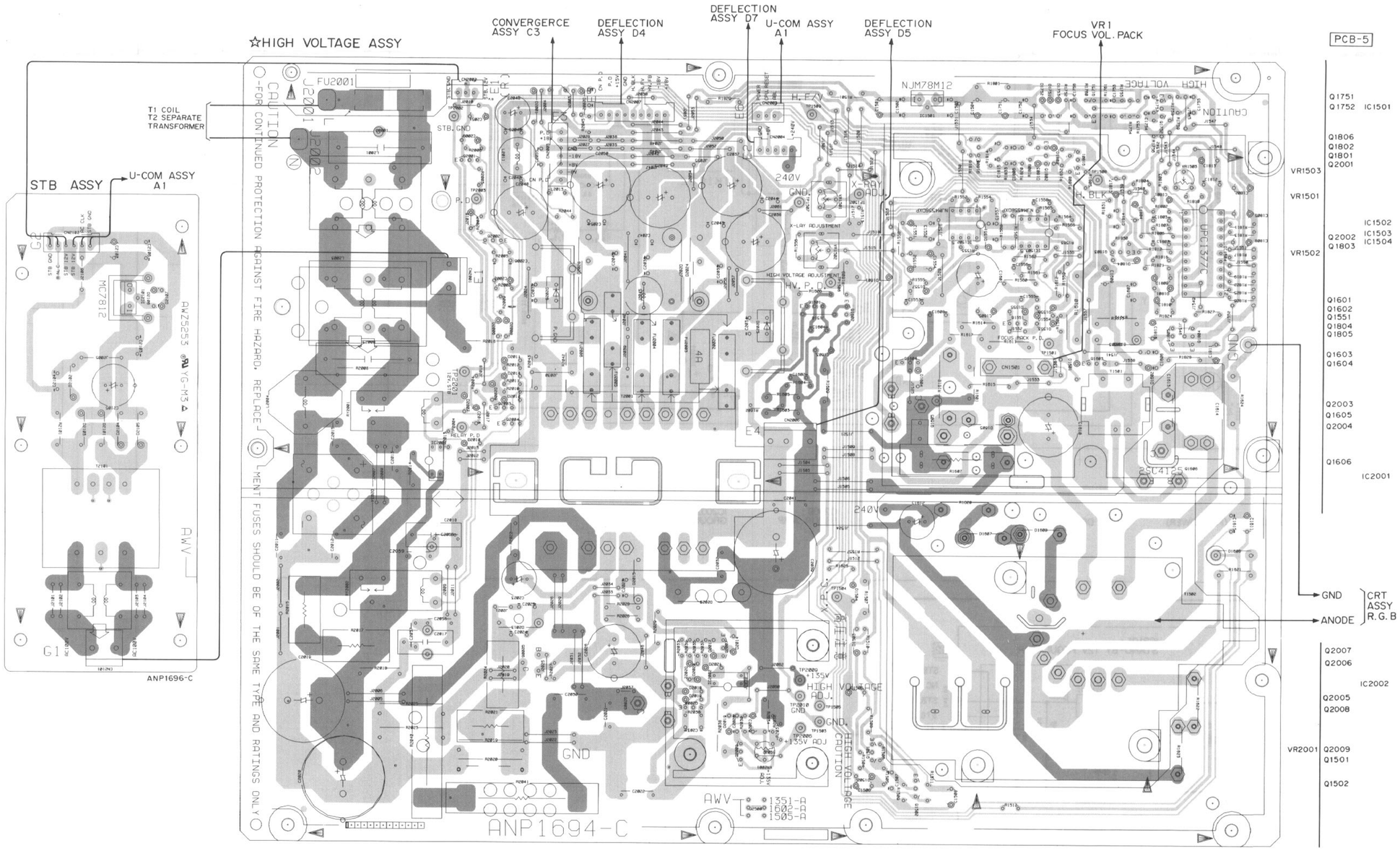


(12) Q2005 Collector for GND
(GND : R2020 wire of R2041 side)
V Range : 50V/div.
H Range : 5 μ sec/div.



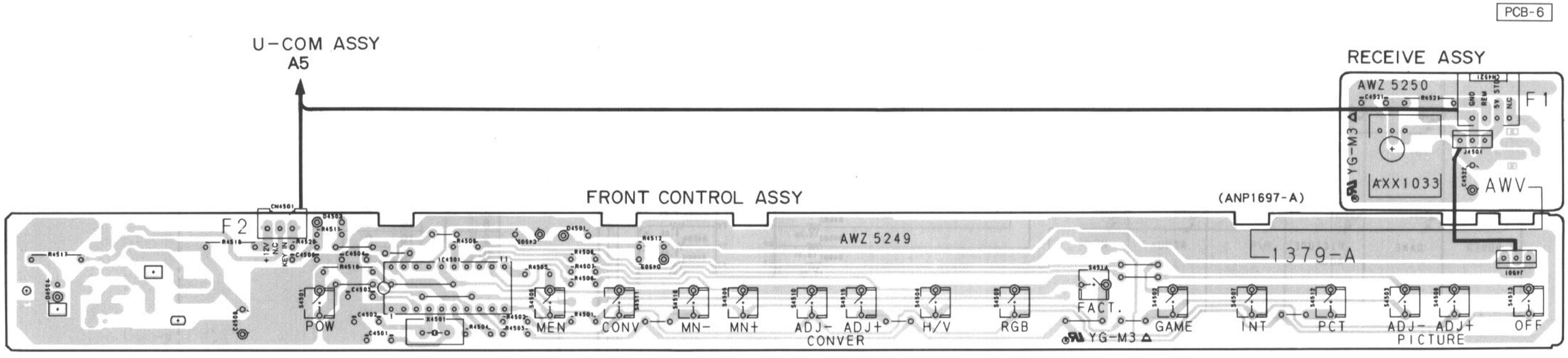
5.18 HIGH VOLTAGE ASSY (2/2)





mark shows a high voltage generation point (excepting the charged section).

• This diagram is viewed from the mounted parts side.



• This diagram is viewed from the mounted parts side.

6. PCB PARTS LIST

NOTES:

- *Parts marked by "NSP"are generally unavailable because they are not in our Master Spare Parts List.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *Parts marked by " ⊙ "are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*
- *When ordering resistors, first convert resistance values into code form as shown in the following examples.*

  Ex.1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47K ohm (tolerance is shown by J=5%, and K=10%).

  560 Ω →56 × 10¹→561 ..... RD1/4PU 5 6 1 J

  47 kΩ →47 × 10³→473 ..... RD1/4PU 4 7 3 J

  0.5 Ω →0R5 ..... RN2H 0 R 5 K

  1 Ω →1R0 ..... RS1P 1 R 0 K

  Ex.2 When there are 3 effective digits (such as in high precision metal film resistors).

  5.62 k → 562 × 10¹→ 5621 ..... RN1/4PC 5 6 2 1 F

- *Parts marked by ☆ are important parts which relate in X-rays radiation.*

  If any of these parts need to be replaced, always replace with specified parts.
- *Parts marked by x are important parts which relate in X-rays radiation. If a failure occurs in any of these parts, replace the printed circuit board assembly where the relevant part has already been adjusted as a working component. Do not replace the actual part itself.*

  If any part marked by x is replaced, there is danger of being exposed to X-rays.

LIST OF ASSEMBLIES

Mark	No.	Description	Parts No.
NSP		CRT DRIVE ASSY	AWV1209
		├ R. CRT DRIVE ASSY	AWZ3860
		├ G. CRT DRIVE ASSY	AWZ3861
		└ B. CRT DRIVE ASSY	AWZ3862
		DEFLECTION ASSY	AWV1350
		FRONT ASSY	AWV1379
		├ FRONT CONTROL ASSY	AWZ5249
		└ RECEIVE ASSY	AWZ5250
		RGB ASSY	AWV1504
		├ STB ASSY	AWZ5253
		└ U-COM ASSY	AWZ6015
		CONVERGENCE ASSY	AWV1516
		└ CONVERGENCE MODULE ASSY	AWZ1279
		├ CONVERGENCE GH ASSY	AWZ4500
		├ CONVERGENCE H1 ASSY	AWZ4501
		├ CONVERGENCE H2 ASSY	AWZ4502
		├ CONVERGENCE V1 ASSY	AWZ4503
		├ CONVERGENCE V2 ASSY	AWZ4504
		└ CONVERGENCE V3 ASSY	AWZ4505
☆		HIGH VOLTAGE ASSY	AWV1602

R. CRT DRIVE ASSY

SEMICONDUCTORS

⚠	Q801	2SC2611
	D801	1SS252

COILS AND FILTERS

	L803	LAU101K
	L801,L802	LAU470K

CAPACITORS

⚠	C924 (1000pF/2KV)	ACG1001
	C923 (4.7μF/250V)	ACH-378
	C921	CEJA101M10
	C922	CKCYB681K50

RESISTORS

⚠	R755 (47Ω, 1/2W)	ACN-225
⚠	R752 (1KΩ, 1/2W)	ACN1006
	R753,R754	RS3LMF332J
	Other Resistors	RD1/4PU□□□J

OTHERS

	CRT SOCKET	AKG1004
	HEAT SINK M3	ANH1409
	PLUG 3-P	KM250MA3R
	SCREW	PMB30P100FMC

G.CRT DRIVE ASSY

SEMICONDUCTORS

⚠	Q821	2SC2611
	D821	1SS252

COILS AND FILTERS

	L823	LAU101K
	L821,L822	LAU470K

CAPACITORS

⚠	C934 (1000pF/2KV)	ACG1001
	C933 (4.7μF/250V)	ACH-378
	C931	CEJA101M10
	C932	CKCYB681K50

RESISTORS

⚠	R765 (47Ω, 1/2W)	ACN-225
⚠	R762 (1kΩ, 1/2W)	ACN1006
	R763,R764	RS3LMF332J
	Other Resistors	RD1/4PU□□□J

Mark	No.	Description	Parts No.
OTHERS			
		CRT SOCKET	AKG1004
		HEAT SINK M3	ANH1409
		PLUG 3-P	KM250MA3
		SCREW	PMB30P100FMC

B.CRT DRIVE ASSY

SEMICONDUCTORS			
⚠		Q841	2SC2611
		D841	1SS252
COILS AND FILTERS			
		L843	LAU101K
		L841,L842	LAU470K
CAPACITORS			
⚠		C944 (1000pF/2KV)	ACG1001
		C943 (4 7μF/250V)	ACH-378
		C941	CEJA101M10
		C942	CKCYB681K50
RESISTORS			
⚠		R775 (47Ω, 1/2W)	ACN-225
⚠		R772 (1kΩ, 1/2W)	ACN1006
		R773,R774	RS3LMF332J
		Other Resistors	RD1/4PU□□□J
OTHERS			
		CRT SOCKET	AKG1004
		HEAT SINK M3	ANH1409
		PLUG 3-P	KM250MA3B
		PLUG 5-P	KM250MA5
		SCREW	PMB30P100FMC

DEFLECTION ASSY

SEMICONDUCTORS			
		IC6501	M52036SP
		IC6506	NE555P
		IC6507, IC6508	NJM311D
		IC1001, IC6503-IC6505	NJM4558DXP
		IC1002, IC6509	NJM78M12FAS
		IC1003	TC74HC4538AP
		IC1004, IC6502	UPC1377C
		Q6503, Q6507, Q6510, Q6512	2SA1048
		Q6514, Q6515, Q6522, Q6523	2SA1048
		Q1003, Q1004	2SA1145
		Q1001, Q1010, Q1013, Q2203	2SA933S
		Q1002, Q1005, Q1007, Q1011, Q1014	2SC1740S
		Q1016, Q1017, Q2202	2SC1740S
		Q6501, Q6502, Q6504-Q6506	2SC2458
		Q6508, Q6509, Q6511, Q6513	2SC2458
		Q6516-Q6521, Q6524, Q6525	2SC2458
		Q2204	2SC2611
		Q1006	2SC2705
⚠		Q1009	2SC3332
⚠		Q1015	2SC4633
⚠		Q1008	2SD1276A
		Q2201, Q2205	2SD1276A
⚠		Q1012	2SD2300
		D1037	11DF2FD
		D1001, D1003-D1009, D1013	1SS252
		D1016-D1021, D1023-D1032, D1035	1SS252
		D1039-D1042	1SS252
		D2208	ES1F
		D2204, D2206, D2207, D6501-D6506	HSS104-02
		D6508, D6509	HSS104-02
		D2201	HZS11B2L
		D2203	HZS7A2L
		D6507	RD10ESB2
		D1012	RD15ESB
		D2202	RD3 3ESB2
		D1022	RD5 1ESB
		D1010, D1011	RD5 1ESB2
		D1034	RD6 2ESB2
		D2205	RD6 2ESB3
		D6510-D6513	RD7 5ESB2
		D1002	RL4Z(A)
⚠		D1036, D1038	RP1H
⚠		D1033	S5688G
COILS AND FILTERS			
⚠		T1002	ATK1045
⚠		T1001	ATK1084
⚠		L1002	ATL1105
		L1003-L1005	ATX1023
		L6502	LAU4R7K
		L6501	LTA102J
⚠		L1001	LTA123J
		L2201	LTA272J
CAPACITORS			
⚠		C1047, C1049	ACG-035
⚠		C1051 (680pF/2KV)	ACG1024
⚠		C1024 (33μF/160V)	ACH-370
⚠		C1036 (1μF/160V)	ACH-372
		C6537	CFTXA105J50
⚠		C1023 (100μF/160V)	ACH1006
		C2208 (4 7μF/400V)	ACH1215
		C6511, C6512	CCCCH151J50
		C1019, C1026 C1030	CCCSL101K500
		C6520	CCCSL221J50
		C1010	CCCSL271J50
		C6546	CCCSL470J50
		C1042	CCDSL101J50
		C1056	CEANP4R7M50
		C1009, C2204, C6503 C6535	CEAS010M50
		C1018	CEAS100M100
		C1001, C1046, C2203 C2205, C2206	CEAS100M50
		C6506 C6540	CEAS100M50
		C6557	CEAS101M10
		C2201, C2207, C6508, C6564, C6565	CEAS101M16
		C1007, C1008, C1033, C1048 C1050	CEAS101M25
		C1059, C1062, C6517	CEAS101M25
		C1038, C1039	CEAS220M16

Mark	No.	Description	Parts No.
	C6558		CEAS220M25
	C1043		CEAS221M16
	C1029, C1035, C6524, C6525, C6527		CEAS2R2M50
	C6532		CEAS2R2M50
	C1005		CEAS331M16
	C1041		CEAS3R3M50
	C1014, C1034, C6509, C6521, C6528		CEAS470M16
	C6548, C6550, C6552, C6554, C6562		CEAS470M16
	C6567		CEAS470M16
	C1022		CEAS470M25
	C6501, C6502, C6543		CEAS4R7M50
	C1040		CEASR47M50
	C6507		CEASR68M50
	C1028		CEHAQ010M2C
⚠	C1053		CFPHW123H3D
⚠	C1052		CFPHW683J3A
⚠	C1055		CFPMW474J2D
	C1045		CFTXA105J50
	C1015		CFTXA684J50
	C1016		CKCYB103K50
	C1057		CKCYB391K500
	C6556		CKCYB471K50
	C6559, C6560		CKCYB561K50
	C1017, C1044, C1058, C6505, C6510		CKCYF103Z50
	C6514, C6518, C6531, C6542, C6566		CKCYF103Z50
	C1004		CKCYF223Z50
	C6504		CKCYF472Z50
	C1006, C1020, C1027, C1060, C1061		CKCYF473Z50
	C6516, C6523, C6530, C6547, C6549		CKCYF473Z50
	C6551, C6553		CKCYF473Z50
	C1031		CKCYX104M25
	C2202		CKDYB681K50
	C6526		CQMA102J50
	C1011		CQMA103J50
	C1025, C1054		CQMA183J50
	C1002		CQMA223J50
	C6545		CQMA272J50
	C6522		CQMA274J50
	C6544		CQMA332J50
	C6529, C6533, C6536, C6539		CQMA333J50
	C1021, C6563		CQMA471J50
	C1032, C6519		CQMA472J50
	C6541		CQMA562J50
	C6538, C6561		CQMA563J50
	C6555		CQMA821J50
	C1013		CQPA301J100
	C6515		CQPA331J100
	C1003		CQPA333G100
	C1037		CQPA682G100

RESISTORS

⚠	R1108 (33KΩ, 1/2W)		ACN1011
	R1111-R1113, R1118-R1120		RD1/2PM101J
	R1027		RD1/2PM102J
	R1033, R1035		RD1/2PM104J
	R1110		RD1/2PM152J
	R2210		RD1/2PM153J
	R1026		RD1/2PM154J
	R2212		RD1/2PM394J
	R1012, R1044		RD1/2PM471J
	R1059		RD1/2PM473J
	R2211		RD1/2PM683J
	R1039 R1101		RD1/2PMFL103J
	R1030		RD1/2PMFL152J
	R1025		RD1/2PMFL222J
⚠	R1050		RD1/2PMFL682J
	R1105		RD1/4PM221J
	R1106		RD1/4PM241J
	R1001		RD1/4PMFL100J
	R1082		RD1/4PMFL101J
	R1014		RD1/4PMFL2R2J
⚠	R1048		RD1/4PMFL470J
⚠	R1054		RD1/4PMFL471J
	R6581		RD1/4PMFL4R7J
	R1104		RN1/2PC7500F
	R1095		RN1/4PC1002F
	R1009		RN1/4PC1203F
	R2203		RN1/4PC1601F
	R1100		RN1/4PC1801F
	R1043		RN1/4PC1802F
	R1008		RN1/4PC2002F
	R1020		RN1/4PC2202F
	R2213		RN1/4PC2403F
	R2204		RN1/4PC2701F
	R1094		RN1/4PC2702F
	R1098		RN1/4PC3001F
	R2214		RN1/4PC7501F
	R1066		RN1/4PC9101F
	R1079		RS1LMF151J
	R1078		RS1LMF272J
⚠	R1076		RS1LMF331J
⚠	R1083 R1087, R1090, R1092, R1096		RS1LMF563J
	R1109		RS1LMF680J
⚠	R1057		RS1LMF682J
⚠	R1084, R1088, R1091, R1093, R1097		RS1LMF683J
⚠	R1031		RS2LMF2R2J
⚠	R1068		RS2LMF3R3J
	R2215		RS3LMF1R8J
	VR6501 (2.2kΩ)		ACP1041
	VR6502 (10kΩ)		ACP1043
	VR1001,VR1002		VRTS6VS472
	Other Resistors		RD1/4PU□□□J

OTHER

		SCREW	ABA-234
	CN1002	PLUG 3-P	AKM-058
⚠	CN1010	PLUG 3-P	AKM1055
⚠	CN1003-CN1008	PLUG 6-P	AKM1072
		HEAT SINK M	ANH-697
		SCREW	BBZ30P080FCU
	CN6501	PLUG 11-P	KM250MA11
	CN1009	PLUG 3-P	KM250MA3

Mark	No.	Description	Parts No.
	CN1011	PLUG 4-P	KM250MA4
	CN2202	PLUG 5-P	KM250MA5
	CN2201	PLUG 5-P	KM250MA5R
	CN1001	PLUG 9-P	KM250MA9
		SCREW	PBZ30P080FMC

FRONT CONTROL ASSY

SEMICONDUCTORS

	IC4501	PD5136
	D4504	AEL-459
	D4502, D4503	HSS104-02
	D4501	RD3 0ESB

SWITCHES AND RELAYS

	S4501-S4516	ASG1034

CAPACITORS

	C4501, C4502	CCDCH221J50
	C4508	CEJA100M16
	C4505	CEJA2R2M50
	C4503	CFTXA104J50
	C4506	CKDYB472K50
	C4504	CKDYF103Z50

RESISTORS

	R4518	RD1/2PM100J
	R4517	RD1/2PM821J
	Other Resistors	RD1/4PU□□□J

OTHERS

	LED HOLDER	AMR1733
X4501	CERAMIC OSCILLATOR	ASS1043
CN4501	PLUG 3-P	KM250MA3R

RECEIVE ASSY

CAPACITORS

	C4521	CCCSL121J50
	C4522	CEJA101M10

RESISTORS

	All Resistors	RD1/4PU□□□J

OTHERS

	REMOTE RECEIVER UNIT	AXX1033
CN4521	PLUG 4-P	KM250MA4L

STB ASSY

SEMICONDUCTORS

	IC2101	NJM7812FAS
	D2101, D2103-D2105	1SS145
	D2106, D2107	HSS104-02
	D2102	HZS36-1L

TRANSFORMERS

	T2101	ATT1145

Mark	No.	Description	Parts No.

CAPACITORS

	C2102	CEAS010M50
	C2105	CEAS102M25
	C2103, C2104 C2106	CKCYF103Z50

RESISTORS

	All Resistors	RD1/4PU□□□J

OTHERS

CN2101	PLUG 2-P	AKM-089
	HEAT SINK	ANH-575
CN2102	PLUG 6-P	KM250MA6
	SCREW	PBZ30P080FMC

U-COM ASSY

SEMICONDUCTORS

	IC5501	M51387P
	IC4503	MC34064P
	IC5504	NJM7812FAS
	IC5506	NJM78M05FAS
	IC5505	NJM78M09FAS
	IC4504	NJM78M12FAS
	IC4501	PD5235B
	IC5502,IC5503	SN74LS05N
	IC4507	TC74HC107AP
	IC4506	TC74HC132AP
	IC4505	TC74HC14AP
	IC4502	X24C08P
	Q4501, Q4510, Q4515-Q4519	2SA1048
	Q5507-Q5509, Q5511, Q5514, Q5515	2SA1048
	Q5519-Q5524, Q5532-Q5534, Q5544	2SA1048
	Q5549	2SA1048
	Q4508	2SC2235
	Q4502, Q4506, Q4507, Q4509	2SC2458
	Q4511, Q4512, Q4522-Q4524	2SC2458
	Q4527, Q4528, Q5501-Q5506, Q5510	2SC2458
	Q5512, Q5513, Q5516-Q5518	2SC2458
	Q5525-Q5531 Q5535-Q5543	2SC2458
	Q5545-Q5548	2SC2458
	Q4503, Q4504 Q4525 Q4526	XDC143ES
	D4521	1SV147
	D4502-D4506, D4509 D4511	HSS104-02
	D4513-D4518 D4522-D4524	HSS104-02
	D4529, D4530 D5501-D5505	HSS104-02
	D5507-D5509 D5511, D5512, D5518	HSS104-02
	D5520, D5522, D5524, D5525	HSS104-02
	D4527, D4528	RD15ESB2
	D4510	RD5 1ESB2
	D5510	RD5 6ESB2
	D4501, D4507, D4508 D4512	RD6 8ESB2
	D4525, D4526	RD6 8ESB2
	D5519, D5521, D5523	S5688G

COIL AND FILTERS

	L4502	LAU010K
	L5501	LAU180K
	L4501	LAU220K

Mark	No.	Description	Parts No.
SWITCHES AND RELAYS			
	S5501, S5502		ASH1026
CAPACITORS			
	TC4501		ACM-020
	C5545-C5547, C5553-C5555		CCCCH560J50
	C4510		CCCCH820J50
	C5532-C5534, C5538		CCCSL101J50
	C5535-C5537		CCCSL151J50
	C4536		CCCSL470J50
	C5542-C5544		CCCSL680J50
	C4501		CEANPR47M50
	C4525		CEAS010M100
	C4518-C4522, C5516		CEAS010M50
	C4503		CEAS0R1M50
	C5510, C5511, C5513, C5515		CEAS100M50
	C5501-C5503, C5506-C5508		CEAS101M10
	C5523, C5550		CEAS101M25
	C4527, C4530		CEAS101M50
	C5539, C5552		CEAS102M16
	C4517, C4523, C5504		CEAS220M50
	C5514, C5528-C5530		CEAS2R2M50
	C5556		CEAS331M16
	C5517		CEAS3R3M50
	C4505, C4514, C5518-C5520, C5522		CEAS470M25
	C5540, C5541, C5548, C5549		CEAS470M25
	C4512		CEAS470M50
	C4508, C4540, C5505		CEAS4R7M50
	C4506		CEAS6R8M50
	C4534, C4541		CKCYB102K50
	C4532		CKCYB152K50
	C4509		CKCYB222K50
	C4535		CKCYB471K50
	C4533		CKCYB561K50
	C4502, C4515, C4524, C4528, C4529		CKCYF103Z50
	C5524-C5527, C5551		CKCYF103Z50
	C5521		CKCYF472Z50
	C4504, C4507, C4513, C4516, C4526		CKCYF473Z50
	C4531, C4537-C4539		CKCYF473Z50
	C5512, C5531		CKCYX104M25
RESISTORS			
	R5623-R5625, R5638-R5640		RD1/2PM100J
	R5617, R5619, R5621		RD1/2PM221J
	R5635-R5637		RD1/2PM271J
	R5632-R5634		RD1/2PM681J
	R4533		RD1/2PMFL390J
	R4628		RD1/2PMFL680J
	R4551		RD1/2PMFL6R8J
	R5646		RD1/4PMFL120J
	R5663, R5666		RN1/4PC1002F
	R5664, R5667		RN1/4PC1202F
	R5660		RN1/4PC1502F
	R5661		RN1/4PC2202F
	R5658		RN1/4PC2701F
	R5657		RN1/4PC3001F
	R5662		RN1/4PC3601F
	R5665, R5668		RN1/4PC5601F
	R5647		RS1LMF2R2J
	Other Resistors		RD1/4PU□□□J

Mark	No.	Description	Parts No.
OTHERS			
		HEAT SINK	ANH-575
	X4501	CERAMIC OSCILLATOR	ASS1022
	CN5501	PLUG 11-P	KM250MA11
	CN4503	PLUG 5-P	KM250MA5
	CN4502	PLUG 6-P	KM250MA6R
	CN4501	PLUG 8-P	KM250MA8
	CN5502	PLUG 9-P	KM250MA9
		SCREW	PBZ30P080FMC

CONVERGENCE ASSY

SEMICONDUCTORS		
	IC2505-IC2509	M5220P
	IC2501	NJM78M05FAS
	IC2502	NJM79M05FA
	IC2503,IC2504	PA0053B
	IC2512	SN74LS74AN
	IC2510,IC2511	STK392-020
	Q2501, Q3002, Q3010	2SA1048
	Q3006, Q3016	2SA992
	Q3014	2SB950A
	Q3007	2SB951A
	Q3012	2SC1845
	Q3008	2SC2235
	Q2502-Q2504, Q3001, Q3003-Q3005	2SC2458
	Q3009, Q3011, Q3013	2SC2458
	Q3015	2SD1276A
	D3006	11DF2FD
	D2501, D2505, D2506, D2508, D2512	HSS104-02
	D2516, D2523-D2526, D2561-D2564	HSS104-02
	D3001-D3005, D3007-D3010, D3012	HSS104-02
	D2502-D2504, D2509-D2511	RD12ESB
	D2513-D2515, D2517-D2522	RD12ESB
	D2528-D2551, D2558-D2560	RD12ESB
	D2552	RD5.1ESB
	D2507, D2527	RD6.2ESB
COILS AND FILTERS		
	L2501, L2502	ATH-059
SWITCHS AND RELAYS		
	S2501	ASH1005
CAPACITORS		
	C2507, C2512, C2513, C2538, C2541	CCCSL120J50
	C2544, C2545, C2549, C2550	CCCSL120J50
	C2560-C2562	CCCSL680J50
	C3014	CEANP3R3M50
	C2515, C2516, C2522, C2524, C2525	CEAS010M50
	C2536	CEAS010M50
	C2501, C2520, C2521, C3001, C3012	CEAS101M10
	C3017	CEAS101M25
	C3019	CEAS1R5M50
	C2517, C3005	CEAS220M50
	C3006	CEAS2R2M50
	C2534, C2537	CEAS330M35
	C2533	CEAS470M25
	C2535	CEAS4R7M50
	C2523	CEASR47M50
	C3009	CEHAQ100M50

Mark	No.	Description	Parts No.
	C2556-C2559		CEHAQ470M25
	C2502, C2503, C3002, C3003		CEHAQ471M25
	C3008		CEHAQ471M35
	C2529, C2531		CFTXA224J50
	C2568, C3007, C3018		CKCYB102K50
	C3010		CKCYB222K50
	C2547, C2548, C2552-C2555, C3011		CKCYB331K50
	C3013, C3015		CKCYB331K50
	C2504-C2506, C2510, C2511		CKCYF103Z50
	C2526, C2527, C2539, C2540		CKCYF103Z50
	C2542, C2543, C2546, C2551		CKCYF103Z50
	C2566, C2567, C3004		CKCYF103Z50
	C2508, C2518		CQMA102J50
	C2532		CQMA104J50
	C2509, C2514, C2519, C2528		CQMA471J50
	C2530		CQMA562J50
RESISTORS			
	R3028		RD1/2PMFL103J
	R2657, R2659, R2661		RD1/2PMFL121J
	R2656, R2658, R2660		RD1/2PMFL221J
	R3035		RN1/4PC3900F
	R2532, R3003, R3006		RS1LMF010J
	R3019		RS1LMF330J
	R2507, R2514		RS1LMFR33J
	R3030, R3031, R3037		RS2LMF010J
	R2636, R2641, R2646-R2649		RS2LMF1R8J
	R2533		RS2LMF8R2J
	Other Resistors		RD1/4PU□□□J
OTHERS			
		HEAT SINK	ANH-575
		CONVERGENCE PCB	ANP1695
		SCREW	BBZ30P080FCU
	CN2506	PLUG 4-P	KM250MA4
	CN2507	PLUG 4-P	KM250MA4B
	CN2505	PLUG 4-P	KM250MA4R
	CN2509, CN2510	PLUG 6-P	KM250MA6
	CN2504	PLUG 7-P	KM250MA7
	CN2503	PLUG 7-P	KM250MA7R
	CN2502	PLUG 8-P	KM250MA8
	CN2501	PLUG 8-P	KM250MA8B
		SCREW	VBZ30P080FMC
		SCREW	VBZ30P120FMC
		SCREW	VBZ30P160FMC

CONVERGENCE GH ASSY

Mark	No.	Description	Parts No.
SEMICONDUCTORS			
	IC4200		PM0002B
	Q4200		2SC2712
	D4200		RD12ESB
CAPACITORS			
	C4200, C4201		CKSQYB103K50
RESISTORS			
	R4200, R4205		RD1/4PU2R2J
	R4206, R4210, R4221		RS1/8S000J
	R4207		RS1/8S102J
	R4214		RS1/8S223J
	R4212		RS1/8S273J
	Other Resistors		RS1/10S□□□J
OTHERS			
	TERMINAL5P		AKC1025
	TERMINAL 12P		AKC1032

CONVERGENCE H1 ASSY

Mark	No.	Description	Parts No.
SEMICONDUCTORS			
	IC4230		PM0002B
	Q4230		2SC2712
	D4230		RD12ESB
CAPACITORS			
	C4230, C4231		CKSQYB103K50
RESISTORS			
	R4230, R4233		RD1/4PU2R2J
	Other Resistors		RS1/10S□□□J
OTHERS			
	TERMINAL5P		AKC1025
	TERMINAL 12P		AKC1032

CONVERGENCE H2 ASSY

Mark	No.	Description	Parts No.
SEMICONDUCTORS			
	IC4260		PM0002B
	Q4260		2SC2712
	D4260		RD12ESB
CAPACITORS			
	C4260, C4261		CKSQYB103K50
RESISTORS			
	R4260, R4263		RD1/4PU2R2J
	Other Resistors		RS1/10S□□□J
OTHERS			
	TERMINAL5P		AKC1025
	TERMINAL 12P		AKC1032

CONVERGENCE V1 ASSY

Mark	No.	Description	Parts No.
SEMICONDUCTORS			
	IC4290		PM0002B
	Q4290		2SC2712
	D4290		RD12ESB
CAPACITORS			
	C4290, C4291		CKSQYB103K50
RESISTORS			
	R4290, R4293		RD1/4PU2R2J
	Other Resistors		RS1/10S□□□J
OTHERS			
	TERMINAL5P		AKC1025
	TERMINAL 12P		AKC1032

Mark	No.	Description	Parts No.
CONVERGENCE V2 ASSY			
SEMICONDUCTORS			
	IC4320		PM0002B
	Q4320		2SC2712
	D4320		RD12ESB
CAPACITORS			
	C4320, C4321		CKSQYB103K50
RESISTORS			
	R4320, R4323		RD1/4PU2R2J
	Other Resistors		RS1/10S□□□J
OTHERS			
	TERMINAL5P		AKC1025
	TERMINAL 12P		AKC1032
CONVERGENCE V3 ASSY			
SEMICONDUCTORS			
	IC4350		PM0002B
	Q4350		2SC2712
	D4350		RD12ESB
CAPACITORS			
	C4350, C4351		CKSQYB103K50
RESISTORS			
	R4350, R4353		RD1/4PU2R2J
	Other Resistors		RS1/10S□□□J
OTHERS			
	TERMINAL5P		AKC1025
	TERMINAL 12P		AKC1032
☆ HIGH VOLTAGE ASSY			
SEMICONDUCTORS			
	IC1502, IC1503		NJM4558DXP
	IC1501		NJM78M12FAS
⚠	IC2001, IC2002		PC817AB
X	IC1504		
	Q1601, Q1602		2SA1145
X	Q1501, Q1502		
	Q1804, Q2001, Q2008		2SA933S
⚠	Q2006		2SB824
	Q1751, Q1752, Q1801-Q1803		2SC1740S
	Q1805, Q1806, Q2002-Q2004		2SC1740S
	Q1551, Q2009		2SC2705
⚠	Q1605		2SC3281
⚠	Q1603, Q1604		2SC3332
	Q2007		2SC3332
⚠	Q2005		2SC4109
⚠	Q1606		2SC4125
	D2013, D2015		11DF1FD
⚠	D1603		11DF2FD
⚠	D1607, D1608		ES1F
	D2025, D2026		FMP-G12S
	D1501, D1503, D1504, D1553-D1556		HSS104-02
	D1601, D1602, D1604, D1751-D1753		HSS104-02
	D1803, D2001, D2002, D2006-D2012		HSS104-02
	D2014, D2016-D2018, D2020-D2022		HSS104-02
	D2019		HZS6C2L
	D1557		RD11ESB2
	D1551		RD15ESB2
X	D1502		
	D1552, D1802		RD5.1ESB2
	D1801		RD6.2ESB2
	D1804		RD9.1ESB2
⚠	D1605		RL4Z
	D2024, D2027, D2028		RL4Z
X	D1606		
	D2023		RU4A
⚠	D2034		S5VB60F
COILS AND FILTERS			
⚠	L2003		ATF1031
⚠	L2001		ATF1118
	L2011		ATH-133
	L2004		ATH1009
⚠	T1501		ATK1045
⚠	T1502		ATK1081
	L1501-L1503, L2002, L2005-L2010		ATX1023
	L2012, L2014-L2017		ATX1023
	L2013		LAU010K
TRANSFORMERS			
⚠	T2001		ATK1082
SWITCHES AND RELAYS			
⚠	RY2002		ASR1027
⚠	RY2001		ASR1036
CAPACITORS			
⚠	C2001 (0.22µF/125V)		ACE-213
⚠	C2008 (0.1µF/250V)		ACE7004
⚠	C2011-C2013, C2015 (0.01µF/250V)		ACG-001
	C2032 (100pF/2KV)		ACG-032
⚠	C1613 (1000pF/2KV)		ACG-033
	C2021 (2200pF/2KV)		ACG-039
	C2022 (0.01µF/1KV)		ACG-045
	C2030 (4700pF/2KV)		ACG1028
	C2056-C2059 (7400P/250V)		ACG7009
	C2023 (4.7µF/250V)		ACH-378
	C1610 (10µF/160V)		ACH1117
	C2026 (47µF/100V)		ACH1132
	C2039 (560µF/160V)		ACH1146
	C2019, C2020 (820µF/200V)		ACH1164
	C1606, C2055		CCCSL101J50
	C1555, C1604, C1608, C1806		CCCSL101K500
	C2024, C2027, C2033-C2036, C2045		CCCSL221K500
	C2029		CEAS010M50
	C2009, C2051		CEAS100M50
	C1751, C1802, C1816		CEAS101M25
	C1808, C1809		CEAS220M50
	C1813		CEAS221M25
	C1801, C1804		CEAS2R2M50
	C1609		CEAS330M100
	C1810		CEAS3R3M50

Mark	No.	Description	Parts No.
	C1805, C2007, C2014, C2016		CEAS470M25
	C2048		CEAS471M35
	C1811		CEASR47M50
	C1605		CEHAQ010M2C
	C1554		CEHAQ010M50
	C1551, C1611		CEHAQ100M50
	C1501, C1504		CEHAQ101M25
	C1612		CEHAQ220M2C
	C1603		CEHAQ220M50
	C1508		CEHAQ221M16
	C1505		CEHAQ221M25
	C2040		CEHAQ222M35
	C2037, C2038, C2049, C2050		CEHAQ222M50
	C1601		CEHAQ330M2C
	C1506		CEHAQ470M25
⚠	C1614		CFPHW103H3D
	C1607		CFTXA105J50
	C2025		CFTXA474J50
	C2006		CKCYB102K50
	C1756		CKCYB122K50
	C1553		CKCYB222K50
	C1502, C1503, C1507, C1552, C1602		CKCYF103Z50
	C1752, C1812, C1814, C1817, C2028		CKCYF103Z50
	C1557, C1615, C1754, C2042-C2044		CKCYF473Z50
	C2046, C2047, C2054		CKCYF473Z50
	C1755		CKCYX104M25
	C2041		CKDYF103Z500
	C1556, C1558		CQMA102J50
	C1753		CQMA183J50
	C2031		CQMA222J50
	C1803		CQMA472J50
	C1815		CQMA821J50
	C1807		CQPA682G100

RESISTORS

⚠	R2008, R2016 (2.2MΩ, 1/2W)		ACN-208
	R1624 (47Ω, 1/2W)		ACN-225
	R2015, R2017 (1Ω, 5W)		ACN1032
	R2024 (1.8Ω, 5W)		ACN1076
	R2021 (2.2Ω, 5W)		ACN1077
	R1608		RD1/2PM104J
	R1602		RD1/2PM124J
	R2034		RD1/2PM154J
	R2026, R2028		RD1/2PM241J
	R1606		RD1/2PM334J
	R2029		RD1/2PM390J
	R1560		RD1/2PM471J
	R1559		RD1/2PM561J
	R1558		RD1/2PM821J
	R1501		RD1/2PMFL100J
	R1605		RD1/4PMFL102J
	R1609		RD1/4PMFL103J
	R1603		RD1/4PMFL122J
	R1829		RD1/4PMFL161J
	R2022		RD1/4PMFL223J
⚠	R1621		RD1/4PMFL2R2J
	R1507, R1801		RD1/4PMFL3R9J
⚠	R1601		RD1/4PMFL470J
⚠	R1617		RD1/4PMFL471J
⚠	R1614		RD1/4PMFL472J

Mark	No.	Description	Parts No.
	R2043		RD1/4PMFL8R2J
⚠	R1622, R1623		RN1/2PC4702F
	R1566		RN1/4PC1001F
	R1563		RN1/4PC1002F
	R1565		RN1/4PC1502F
	R2031, R2032		RN1/4PC1603F
	R2030		RN1/4PC3601F
	R1556		RN1/4PC7502F
	R1810		RN1/4PC9101F
	R1812		RN1/4PC9102F
	R2042		RS1LMF101J
	R1611, R1613		RS1LMF272J
	R2018		RS1LMF683J
	R1620		RS2LMF220J
	R2038		RS2LMF223J
⚠	R1616, R1618		RS3LMF010J
	R2023, R2025		RS3LMF2R2J
⚠	R1610		RS3LMF331J
	R2019, R2020		RS3LMFR22J
	R2040, R2041		RT10PZ150K
	R1607		RT7PZR82K
X	R1504		
X	R1505, R1506, R1511		
X	R1508		
X	R1509		
X	R1512		
X	R1513		
X	R1557		
X	R1612		
X	R1615		
X	VR1501		VRTS6VS102
	VR2001		
X	VR1502		VRTS6VS223
	VR1503		
	Other Resistors		RD1/4PU□□□J

OTHERS

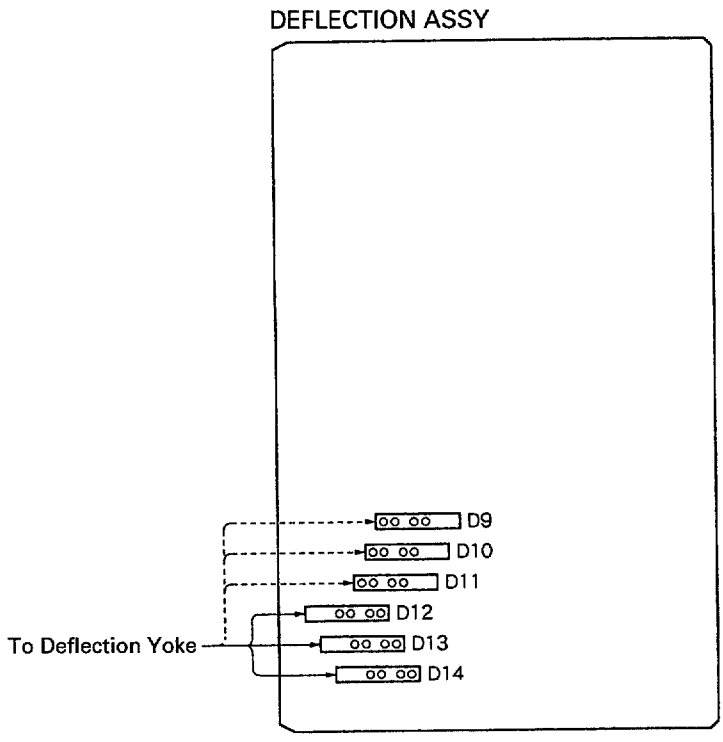
		SCREW	ABA-234
		MICA SHEET	AEP-056
		INSULATING SPACER	AEP-313
	CN2006	PLUG 3-P	AKM-058
	CN2001	PLUG 2-P	AKM-089
	CN1501	PLUG 3-P	AKM1055
	H8007, H8008	FUSE HOLDER	AKR-035
	H2001-H2010, H8001	FUSE CLIP	AKR1003
		HEAT SINK M	ANH-697
		SHIELD CASE	ANH1165
		SCREW	BBZ30P080FCU
	CN2003	PLUG 3-P	KM250MA3
	CN2002	PLUG 3-P	KM250MA3R
	CN2004	PLUG 5-P	KM250MA5R
	CN2005	PLUG 7-P	KM250MA7
	CN2007	PLUG 9-P	KM250MA9
		SCREW	PBZ30P080FMC
		SCREW	VPZ40P100FMC

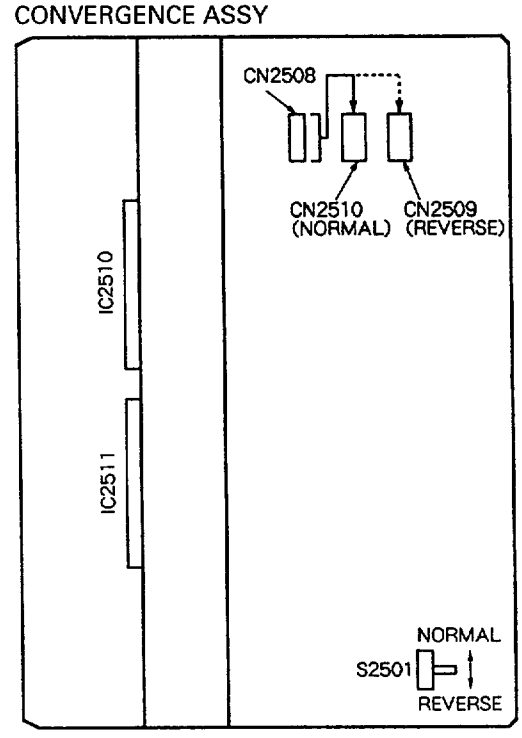
7. LEFT-RIGHT REVERSAL METHOD OF SCREEN

This unit is able to reverse the left and right sides of the screen according to the signals connected. When the sides are reversed, it is necessary to re-adjust the convergence.

The method of reversing the sides is as follows.

1. Check that the power of the unit is OFF, disconnect the connectors from D12, D13, and D14 of DEFLECTION ASSY and re-insert them into D9, D10, and D11 (in any order).
2. Disconnect the connector connected to CN2510 (NORMAL) of CN2508 inside CONVERGENCE ASSY, connect it to CN2509 (REVERSE), and switch the S2501 slide switch to REVERSE.
3. Turn ON the power of the unit, and perform convergence adjustment.





8. ADJUSTMENTS

• Remote control unit

This unit is not provided with a remote control unit.
When performing operations in the factory ADJ mode, the TV remote control unit is required. In such cases, use the remote control unit provided with the SD-M1407, the remote control unit provided with the AXD1369 or a remote control unit with input selection keys (Video 1 , Video 2 , Video 3) .
Because remote control units without the Video 1 to Video 3 keys cannot be used to turn ON/OFF the CRTs of R, G, B during the convergence adjustment, when using these remote control units, perform operations with all the R, G, B output, or open the rear cover, and cover the CRT lens whose color is to be erased with a thick paper (something that will not scratch the lens).

• Service Mode

This mode enables servicing and repairs to be performed using the NTSC standard signal (composite video signal) because the input signals of this unit conforms to RGB specifications.
Input the input signal into the G input terminal of SIGNAL INPUT connector on INPUT PANEL.
Perform the following to set the service mode.

1. Set the slide switch (S5502) for the service mode on the micro-processor assembly to "SERVICE". (As a result, the signal input from the G input terminal is supplied to the R, G, B signal lines.)
2. Set the signal impedance switch (S5501) on the rear panel to ON (75).
3. Select "LEVEL" using the SELECT key for adjusting picture quality on the front control, and set the input level to "HI" using the ADJUSTMENT + , − keys.

Note : • In the service mode, the screen will be black/white even when the color signal is input.
• The input terminal of this unit is an exclusive connector.

- This chapter describes all the adjustments that must be performed for this unit in order.
  For details of adjustments that must be performed for each ASSY, refer to pages 89.
- When replacing the assembly, always replace with the correct parts.
- The symbol in the (#) beside the adjusting point indicates the abbreviation of the assembly corresponding to the adjusting point.
  C : CONVERGENCE ASSY
  D : DEFLECTION ASSY
  H : HIGH VOLTAGE ASSY
  M : U-COM ASSY
  VR1 : Focus variable resistor (VR1)
- The adjusting points and TP terminals of each assembly are shown in Fig. 8-8 to Fig. 8-10.
- Unless specified otherwise, when inputting the test signal, set the service mode, and input the test signal into the G input terminal of SIGNAL INPUT connector on INPUT PANEL.
- Use the NTSC standard signal for the test signal.

• Factory ADJ Mode

The factory ADJ mode can be turned ON/OFF by pressing the S4514 switch with a thin stick from the small hole in the center of the front control. (See Page 107 : Fig. 8-10).
This mode is composed of the three modes:
ADJUSTMENT RANGE mode for speedily checking the changes in the various control functions (CONTR, BRIGHT, H.POSI, V POSI, R GAIN, B GAIN, H SIZE, V SIZE) of the picture quality, etc. of this unit.
ADJUSTMENT OFFSET mode for setting the screen (Pioneer standard) when the set values for picture quality, etc. set by the user are 0.
ADJ CONVER mode for performing the SIZE set values and convergence precision setting when the SIZE settings of GH and GV set in the convergence adjustment by the user are 0.
When the factory ADJ mode is turned ON, the set values of picture quality, etc. set by users are reset as shown in Table 8-1. When the factory ADJ mode has been set back to OFF from ON, set the picture quality, etc. set by the user.

Setting	Set Value	Setting	Set Value
CONTR	0	H SIZE	0
BRIGHT	0	V SIZE	0
H POSI	0	GH SIZE (*1)	0
V POSI	0	GV SIZE (*1)	0
R GAIN	0	GAME MODE	OFF
B GAIN	0		

(*1) : GH SIZE and GV SIZE of the convergence adjustment of STD, CUSTOM 1, CUSTOM 2 of the convergence memory

Table. 8-1

• Use of Factory ADJ Mode

①ADJUSTMENT RANGE mode

When the S4514 switch on the front control (Refer to Fig. 8-10.) is pressed and the factory ADJ mode is turned ON, the ADJUSTMENT RANGE mode screen shown in ① of Fig. 8-1 will be displayed.

This mode enables the control functions for picture quality and H/V POSITION, R/B GAIN, and H/V SIZE to be checked easily at the three points-CNT, MIN, MAX. (The screen need not be moved UP and DOWN using the adjustment ◀ and ▶ keys.) They are checked by pressing the numerical keys of the remote control unit. The following shows the relation between the control functions of picture quality, etc. and the corresponding numerical keys of the remote control unit.

[1] : CONTR	[6] : B GAIN
[2] : BRIGHT	[7] : H SIZE
[3] : H POSI	[8] : V SIZE
[4] : V POSI	
[5] : R GAIN	

For example, to check the changes in BRIGHT, press the [2] key on the remote control unit. By pressing the [2] key continuously, the screen can be changed cyclically in the order of CNT, MIN, MAX. This is the same for the other keys. (For the signal used for checking, use one whose changes can be seen easily.)

Note :

• [3] : When checking H POSI;
CNT : Center position
MIN : Whole screen moves to the left
MAX : Whole screen moves to the right

• [4] : When checking V POSI;
CNT : Center position
MIN : Whole screen moves up
MAX : Whole screen moves down

②ADJUSTMENT OFFSET mode

When the MUTE key on the remote control unit is pressed, the mode changes from the ADJUSTMENT RANGE mode to the ADJUSTMENT OFFSET mode as shown in ② of Fig. 8-1.

The screen where the CONTR, BRIGHT, H POSI, V POSI, R GAIN, and B GAIN are set in this mode is the screen when the above items are set to "0" in the normal state (Pioneer Standard).

Setting can be selected by the PICTURE QUALITY key or numerical key ([1] to [6]) on the remote control unit and setting numbers displayed at the bottom right of the screen can be set using the VOL [+] , [−] keys or ADJUSTMENT ◀, ▶ keys.

③ADJ CONVER mode (Internal signal screen)

When the MUTE key on the remote control unit is pressed, the mode changes from the ADJUSTMENT OFFSET mode to the ADJUSTMENT CONVER mode as shown in ③ of Fig. 8-1.

The convergence (STD, CUSTOM 1, CUSTOM 2) set in this mode corresponds to STD, CUSTOM 1, and CUSTOM 2 of the convergence memory selected in the normal state.

To set this mode, select convergence (STD, CUSTOM 1, CUSTOM 2) adjusted with the CONVERGENCE MEMORY key of this unit, and set this factory ADJ mode.

Note : If the user convergence adjustment mode has been set by pressing the CONVERGENCE key, because the factory ADJ mode will not be set, return to the normal state first and then set the mode.

Select the H/V using the CHANNEL [+] and [−] keys of the remote control unit, and then select the adjustment menu using numerical keys ([1] to [9]).

Perform this adjustment using the VOL [+] , [−] keys and ADJUSTMENT ◀, ▶ keys of the remote control unit.

④ADJ CONVER mode (External signal screen)

By pressing STANDARD/AV MEMORY key of the remote control unit, the screen of the ADJ CONVER mode can be cyclically switched between the ③ internal signal screen shown in Fig. 8-1 and ④ external signal screen shown in Fig. 8-1. The convergence adjustment can be performed using the external signal.

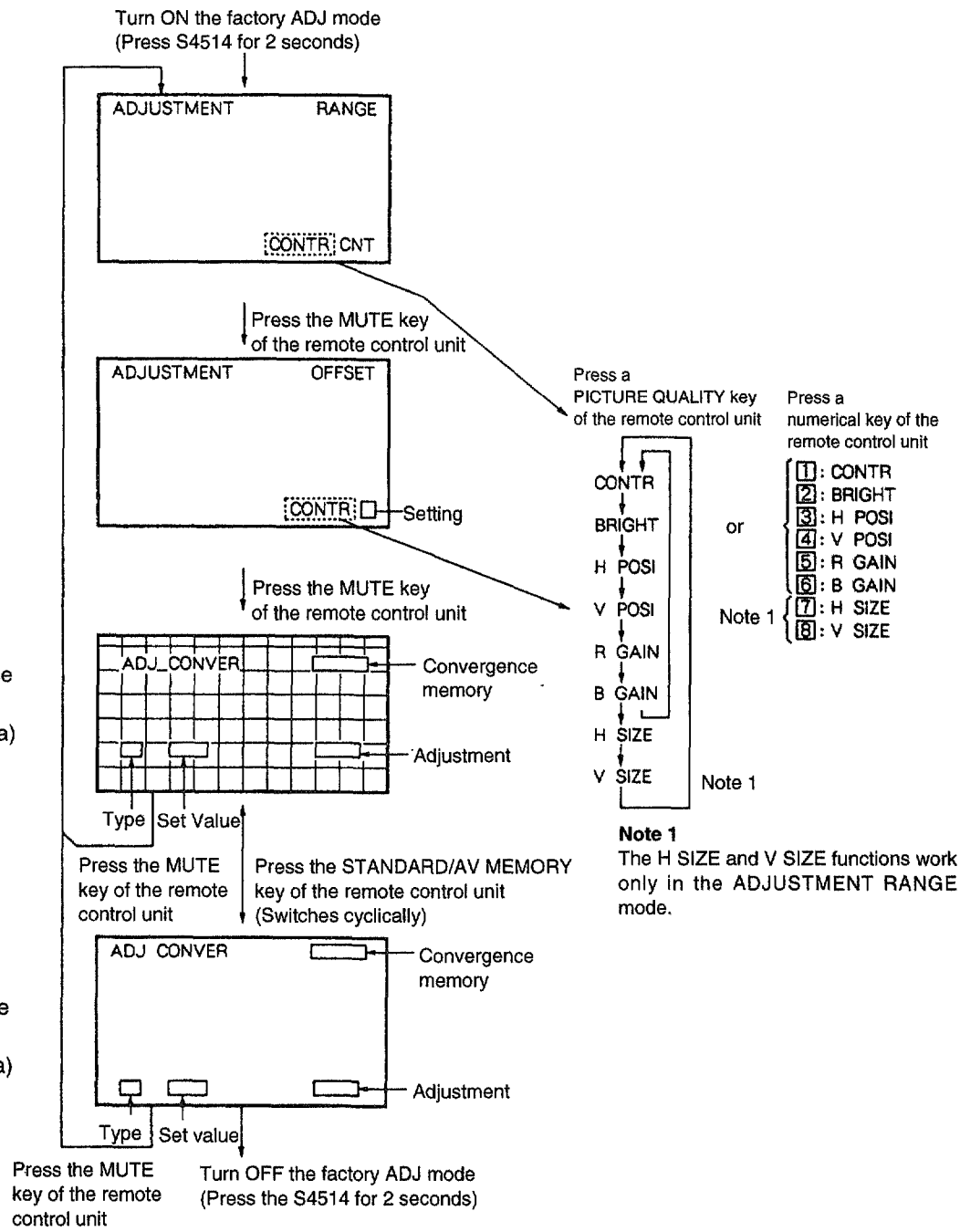
Note: When performing the convergence adjustment, select STD, CUSTOM 1, or CUSTOM 2 using the CONVERGENCE MEMORY key, and then turn ON the factory ADJ mode.

① Check mode for changes in picture quality, SIZE, etc. (Background color : Red)

② PIONEER standard setting mode (Background color : Blue)

③ Setting mode of convergence by internal signal screen (Background color : Magenta)
Note : Serves as cross-hatch screen

④ Setting mode of convergence by external signal screen (Background color : Magenta)
Note : Screen of the signal input from the input terminal



Note 1
The H SIZE and V SIZE functions work only in the ADJUSTMENT RANGE mode.

Fig. 8-1 Screen display in the factory ADJ mode.

8.1 ADJUSTMENTS REQUIRED FOR REPAIRING OR REPLACING ASSY

Note: For details of the adjustment method, refer to "8.2 Adjusting Each Section". The step number in ( ) indicate the step in the "8.2 Adjusting Each Section".

8.1.1 When repairing the HIGH VOLTAGE ASSY

1. (Step 1) 135V power supply adjustment
2. (Step 2) High voltage OSC adjustment
3. (Step 13) Focus VR adjustment
4. (Step 16) White balance adjustment

8.1.2 When repairing the HIGH VOLTAGE ASSY

• Adjustments in (Step 13) and (Step 16)

8.1.3 When repairing the DEFLECTION ASSY

1. (Step 3) Horizontal oscillation frequency adjustment
2. (Step 4) H.F/V voltage adjustment
3. (Step 5) V free-running frequency adjustment
4. (Step 8) H POSITION offset adjustment
5. (Step 9) V POSITION offset adjustment
6. (Step 13) Focus VR adjustment
7. (Step 15) Horizontal size in convergence adjustment
8. (Step 16) White balance adjustment

8.1.4 When replacing the DEFLECTION ASSY

• (Step 15) Horizontal size in convergence adjustment

8.1.5 When repairing or replacing the CONVERGENCE ASSY

1. (Step 15) Convergence adjustment

8.1.6 When repairing the U-COM ASSY

1. (Step 6) Contrast adjustment
2. (Step 7) Bright adjustment
3. (Step 8) H POSITION offset adjustment
4. (Step 9) V POSITION offset adjustment
5. (Step 16) White balance adjustment
6. (Step 17) H center position adjustment

8.1.7 When replacing the U-COM ASSY

• (Step 6), (Step 7), (Step 8), (Step 9), (Step 16)

Note: When replacing the ASSY due to reasons other than memory problems, remove the non-volatile memory IC4502 (X24C08P) from the ASSY to be replaced, and mount it on the new ASSY. Data such as convergence, etc. are stored in this memory IC.

8.1.8 When repairing or replacing the R, G, B, CRT DRIVE ASSY

1. (Step 16)White balance adjustment

8.1.9 When replacing the CRT R, G, B ASSY

Note :

• For details of how to replace the CRT assembly, refer to "9. REPLACING the CRT ASSY".

• When 1 or 2 tubes have been replaced, perform the adjustment according to the tube which has not been replaced.
When a CRT ASSY other than green has been replaced, also adjust according to green.

1. (Step 10 Deflection york tilt adjustment
2. (Step 11) Screen center adjustment
3. (Step 13) Focus VR adjustment
4. (Step 15) Convergence adjustment
5. (Step 16) White balance adjustment

8.1.10When replacing the LENS ASSY

• (Step 12) LENS ASSY focus adjustment

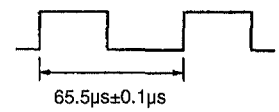
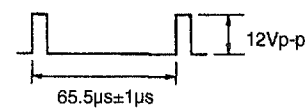
8.1.11When repairing or replacing other ASSY

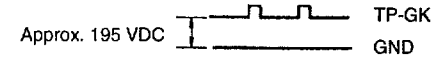
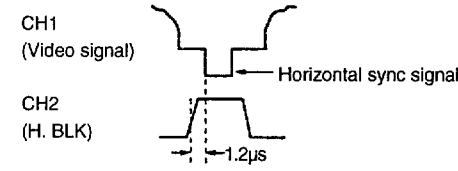
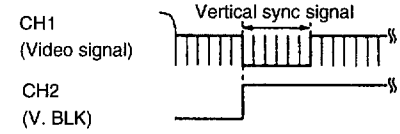
• No adjustment is performed.

8.2 ADJUSTING EACH SECTION

- The adjusting points and TP terminals of each ASSY are shown in Fig. 8-8 to Fig. 8-10.
- The symbol in the ( ) beside the adjusting point indicates the abbreviation of the ASSY corresponding to the adjusting point.
- The abbreviations of the ASSY are shown on the right.
- Unless specified otherwise, set the picture quality to "0".
- For details of the factory ADJ mode and service mode, refer to pages 86 to 88.

C : CONVERGENCE ASSY
D : DEFLECTION ASSY
H : HIGH VOLTAGE ASSLY
M : U-COM ASSY
VR1 : Focus variable resistor (VR1)

<table>
<tr><th>Step</th><th>Adjustment</th><th>Input Signal</th><th>Adjusting Point</th><th>Adjusting Method</th></tr>
<tr><td rowspan="2">1</td><td>135V power supply adjustment</td><td>Color bar</td><td>VR2001</td><td>Adjust so that the voltage between TP2009 (+135V) and TP2010 (GND) becomes 135V±0.5V.</td></tr>
<tr><td colspan="4">Note : Other output voltages of the switching regulator after 135V power supply adjustment are as follows.
<table>
<tr><th>Measuring Point</th><th>Voltage</th><th>Measuring Point</th><th>Voltage</th></tr>
<tr><td>Between +18V (Pin +18V of E3) and GND (TP2010)</td><td>19.2V±0.5V</td><td>Between –8V (Pin –8V of E3) and GND (TP2010)</td><td>–8.3V±0.5V</td></tr>
<tr><td>Between –18V (Pin –18V of E3) and GND (TP2010)</td><td>–19.8V±0.5V</td><td>Between +15V (Pin +15V of E5) and GND (TP2010)</td><td>15.6V±0.5V</td></tr>
<tr><td>Between +8V (Pin +8V of E3) and GND (TP2010)</td><td>11.5V±0.5V</td><td></td><td></td></tr>
</table></td></tr>
<tr><td>2</td><td>High voltage OSC adjustment</td><td>Black burst</td><td>VR1503 (H)</td><td>• Turn OFF the power supply, disconnect the power cord from the outlet, and disconnect only Pin 5 (H. BLK) of the E5 connector of the HIGH VOLTAGE ASSY.
• Input the black burst signal into the G input terminal, and turn ON the power supply.
• Observe the output voltage waveform of Pin 10 (Jumper wire : J1549) of IC1504 (UPC1377), and adjust the period to 65.5μs±0.1μs.
 
65.5μs±0.1μs
• Turn OFF the power supply, disconnect the power cord from the outlet, and connect Pin 5 (H. BLK) of the E5 connector as before (Connect).</td></tr>
<tr><td>3</td><td>Horizontal oscillation frequency adjustment</td><td>No-signal</td><td>VR1002 (D)</td><td>Observe the output waveform of TP1005 (H. BLK) of the DEFLECTION ASSY using the oscilloscope, and adjust so that the period of the pulse becomes 65.5μs±1μs.
 
12Vp-p
65.5μs±1μs
Note: When using a frequency counter, adjust the output frequency of the above TP1005 to 15.3 kHz±0.3 kHz.</td></tr>
<tr><td>4</td><td>H.F/V voltage adjustment</td><td rowspan="2">Any NTSC standard signal</td><td>VR6501 (D)</td><td>Adjust the output voltage of TP6506 (H. F/V) to 5VDC.</td></tr>
<tr><td>5</td><td>V free-running frequency adjustment</td><td>VR6502 (D)</td><td>• Short-circuit between TP6509 (V.f. CHECK) and TP6507 (GND).
• Adjust the frequency of the output pulse of TP6508 (VD.OUT) to 45 Hz.</td></tr>
</table>

Step	Adjustment	Input Signal	Adjusting Point	Adjusting Method
6	Contrast adjustment		CONTR (Remote control unit)	**Note:** Perform this adjustment only when the IC4502 (X24C08P) for the U-COM ASSY data memory has been replaced or when the ADJUSTMENT OFFSET contrast in the factory ADJ mode has been set considerably deviated. • Set to the ADJUSTMENT OFFSET mode of the factory ADJ mode. (Background color : Blue) • Press the numerical key [1] of the remote control unit and select CONTR. • Set the background number to 0 using the VOL [+], [−] or ADJUSTMENT ◀, ▶ keys.
7	Bright adjustment	Black burst	BRIGHT (Remote control unit)	• In the ADJUSTMENT OFFSET mode of the factory ADJ mode, select BRIGHT using the [2] key or PICTURE QUALITY key of the remote control unit. • Adjust the cutoff level of TP-GK of the G.CRT drive assembly to approx. 195 VDC using the VOL [+], [−] or ADJUSTMENT ◀, ▶ keys.  **Note :** After adjusting, exit the factory ADJ mode.
8	H POSITION offset adjustment	Monoscope or any NTSC standard signal	H POSITION (Remote control unit)	• Set the ADJUSTMENT OFFSET mode of the factory ADJ mode. • Press the [3] key of the remote control unit, and select H. POSITION. • Observe the video signal of the input terminal at CH1 on the oscilloscope, and observe the waveform of TP5507 (H. BLK) of the microprocessor assembly at CH2. • Adjust so that the center of the rising edge of the H. BLK waveform of CH2 is 1.2μs ahead of the horizontal sync signal of the CH1 video signal, using the VOL [+], [−] or ADJUSTMENT ◀, ▶ keys. 
9	V POSITION offset adjustment	Monoscope or any NTSC standard signal	V POSITION (Remote control unit)	• In the ADJUSTMENT OFFSET mode of the factory ADJ mode, press the [4] key of the remote control unit and select V POSITION. • Observe the video signal of the input terminal at CH1 on the oscilloscope, and observe the waveform of TP5508 (V. BLK) of the microprocessor assembly. • Adjust so that the vertical sync signal of the CH1 video signal and rising edge of the V. BLK waveform of CH2 are at the same positions, using the VOL [+], [−] or ADJUSTMENT ◀, ▶ keys. 
10	Deflection york tilt adjustment	Using any signal input, set the cross-hatch screen for convergence adjustment	Attaching position of the deflection york for the replaced color (Left and right tilt)	**Note:** This adjustment must be performed when replacing the CRT ASSY and deflection york. • Loosen the fixing screws of the deflection york of the color replaced, rotate to the left and right, and adjust the tilt of the vertical and horizontal lines at the center of the screen to the tilt of the vertical and horizontal lines of the no-replaced color. • After adjusting, tighten the fixing screws of the deflection york properly.

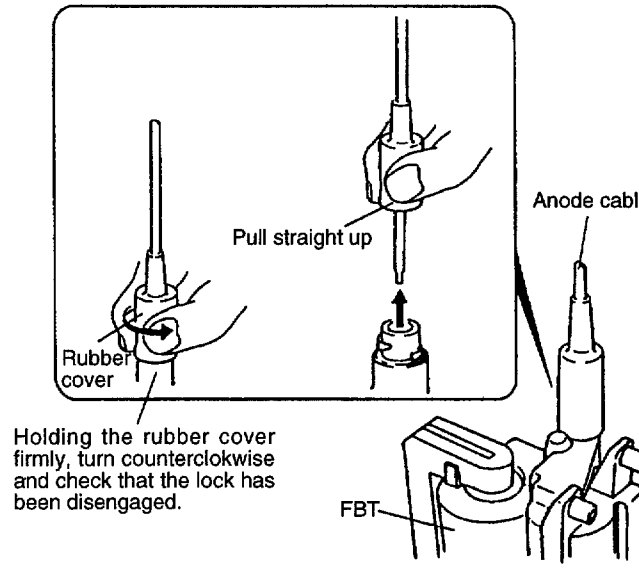
Step	Adjustment	Input Signal	Adjusting Point	Adjusting Method
11	Screen center adjustment	Using any NTSC standard signal input, set the cross-hatch screen for convergence adjustment	Centering magnet of the deflection york for the replaced color (See Fig. 8-9)	**Note:** Perform this adjustment to adjust the center point of the screen when the CRT ASSY and deflection york have been replaced. When adjusting red and blue, begin adjustment after setting the POSITION of the convergence to the center. (When the factory ADJ mode is turned ON once, POSITION of convergence will be set to the center.) • Move the centering magnet of the deflection work of the color replaced, and adjust so that the vertical and horizontal lines of the unreplaced color with those at the center of the screen.
12	Focus adjustment of LENS ASSY	Cross-hatch	LENS ASSY attached to CRT assembly whose color has been replaced	To adjust the LENS ASSY, remove the screen frame, and paste a semi-transparent paper such as tracing paper as shown in Fig. 8-10 using tape, etc. To adjust the distance from the CRT ASSY to the actual screen, place a 5 mm spacer between the semi-transparent paper (tracing paper, etc.) and cabinet (Use a spacer whose thickness is appropriate). • Move the LENS ASSY to the left and right as shown in Fig. 8-10, and optimize the focus.
13	Focus VR adjustment	Cross-hatch	Focus VR (VR1)	• Rotate the focus VR, and optimize the focus. • Repeat adjusting the LENS ASSY and focus VR.
14	H SIZE pre-adjustment	Monoscope	VR1001 (D)	Adjustment for setting the center of the variable range of GH SIZE adjustment of the convergence adjustment. If the horizontal size cannot be adjusted to the standard by the convergence adjustment, adjust so that the average size between the maximum and minimum horizontal sizes in the GH SIZE adjustment is 91%±2%.
15	Convergence adjustment	Cross-hatch	Adjustment items for convergence (Remote control unit)	• Press the [MUTE] key of the remote control unit, and set the ADJ CONVER mode (Background color : Magenta). • With only the green CRT operating, correct so that the green cross-hatch screen becomes normal. • With the green and red CRTs operating, correct the red line so that the green line overlaps with the red line on the cross-hatch screen. • With the green and blue CRTs operating, correct the blue line so that the green line overlaps with the blue line on the cross-hatch screen. **Note:** For details of the adjustment method of convergence, refer to "8.4 Convergence Adjustment (Pages 94 to 105).
16	White balance adjustment	Color bar signal without color signal	Screen VR (VR1) R GAIN (Remote control unit) B GAIN (Remote control unit)	• Press the [MUTE] key of the remote control unit, and set the ADJUSTMENT OFFSET mode (Background color : Blue). • Press the [DISPLAY CALL] key of the remote control unit, erase the "ADJUSTMENT OFFSET" characters (Background numbers will remain). • Adjust the screen VRs (red and green) so that the dark areas of the screen become gray (Do not move the screen VR (green)). • Select R GAIN or B GAIN using the numerical keys [5] (R GAIN) or [6] (B GAIN) of the remote control unit, adjust R GAIN and B GAIN using the VOL [+], [−] or ADJUSTMENT ◀, ▶ keys, so that the bright areas of the screen become white.
17	H center position adjustment	ADJ CONVER mode cross-hatch screen	TC4501 (M)	• Press the [MUTE] key of the remote control unit, and set the ADJ CONVER mode. • Set the cross-hatch screen of the convergence setting mode on ③ internal signal screen". (See Fig. 8-1.) • Adjust so that the 6th vertical line from the left side of the cross-hatch comes to the center of the screen.

8.3 ANODE VOLTAGE MEASURING METHOD

Disconnect the FBT anode cable as outlined in Fig. 8-2.
Measure at the point where the cable enters the FBT.

Caution: Take extra precaution when measuring this high voltage. High voltages are also present in surrounding circuit boards (CRT DRIVE assembly, POWER SUPPLY assembly).

SERVICEMAN WARNING
Before removing the anode cable, turn off the power, unplug the AC plug and let the unit discharge for more than 1 minute.


Anode cable
Pull straight up
Rubber cover
Holding the rubber cover firmly, turn counterclokwise and check that the lock has been disengaged.
FBT

Note : When reconnecting the cable, proceed in the reverse order. After reconnecting, tug on the cable to check that it is secure.

Fig. 8-2 Disconnecting the anode cable

8.4 CONVERGENCE ADJUSTMENT

This adjustment requires the use of the remote control unit. Refer to "Remote Control Unit" (Page 86).

8.4.1 Adjusting Convergence

The convergence adjustment of this unit must be performed in each mode STD, CUSTOM 1, and CUSTOM 2.

After selecting the convergence memory STD, CUSTOM 1, or CUSTOM 2 used for performing the adjustment with the [SELECT] key for the convergence memory of the unit, perform the adjustment in the ADJ CONVER mode of the factory ADJ mode. To synchronize with the screen, input a non-R, G, B NTSC standard signal (any) into the SIGNAL INPUT connector on the INPUT PANEL in the service mode. (Refer to pages 94 to 96 on the factory ADJ mode and service mode.)

The alphabets displayed at the bottom left of the screen shows the convergence types (Type). Switch to the desired convergence by pressing the CHANNEL [+], [−] keys of the remote control unit. The convergence switches cyclically in the following order when the CHANNEL [+] key is pressed : GH→GV→BH→BV→RH→RV. When the CHANNEL [−] key is pressed, the convergence is switched in the reverse order of this from GH.

The right side of the convergence type is the set value. This is adjusted using the VOL [+], [−] keys or ADJUSTMENT ◀, ▶ keys.

The bottom right of the screen displays the adjustment items (Adjustment). Select using the numerical keys [1] to [9] of the remote control unit. However STATIC is not displayed for GH and GV.

By pressing the numerical keys continuously, adjustment items will change cyclically. [2] : SIZE for example will change as follows.

[2] : SIZE→MID SIZE→5D SIZE

As some colors, H and V need not be adjusted, refer to the following table.

• Turning ON/OFF the Red, Green, Blue CRTs

The functions of the remote control unit keys are as follows.

- Press [Video 1] key ..... ON/OFF of red
- Press [Video 2] key ..... ON/OFF of green
- Press [Video 3] key ..... ON/OFF of blue
- Press [LD] key ..... All OFF

Example) To produce only green

- Press the [Video 1] and [Video 3] keys, and turn OFF red and blue.
- Press the [LD], [Video 2] keys, and turn ON only green.

Numerical key	Adjustment	Type GH	GV	RH	RV	BH	BV
[1]	☆ STATIC	/	/	O	O	O	O
[2]	☆ SIZE ↓ MID SIZE ↓ 5D SIZE →	O	O	O	O	O	O
		O	O	O	O	O	O
		/	O	O	O	O	O
[3]	☆ LIN ↓ MID LIN ↓ 6D LIN → (PIN)	O	O	O	O	O	O
		O	O	O	O	O	O
		/	*1	O	*1	O	*1
[4]	☆ SKEW ↓ 3D SKEW ↓ 5D SKEW →	O	O	O	O	O	O
		/	O	O	O	O	O
		/	O	O	O	O	O
[5]	☆ KEY ↓ MID KEY ↓ 3D KEY ↓ MID 3D KEY →	O	O	O	O	O	O
		O	O	O	O	O	O
		O	O	O	O	O	O
		/	O	O	O	O	O
[6]	☆ SUB KEY ↓ MID SUB KEY ↓ 3D SUB KEY ↓ MID 3D KEY →	O	O	O	O	O	O
		O	O	O	O	O	O
		/	O	O	O	O	O
		/	O	O	O	O	O
[7]	☆ BOW ↓ 4D BOW ↓ 6D BOW → (SUB KEY)	O	O	O	O	O	O
		/	O	O	O	O	O
		/	O	*2	O	*2	O
[8]	☆ PIN ↓ MID PIN ↓ 3D PIN ↓ MID 3D PIN →	O	O	O	O	O	O
		O	O	O	O	O	O
		O	O	O	O	O	O
		/	O	O	O	O	O
[9]	☆ SUB PIN ↓ MID SUB PIN ↓ 4D SUB PIN ↓ M4D SUB PIN →	O	O	O	O	O	O
		O	O	O	O	O	O
		/	O	O	O	O	O
		/	O	O	O	O	O

O=Yes, /=No

*1 : The screen is 6D LIN. For GV, RV, and BV, it functions as PIN.

*2 : The screen is 6D BOW. For RH and BH, it functions as SUB KEY.

☆ : Adjustment which can be set even in the user mode. For GH, GV SIZE, the state set in the factory ADJ mode is the state when "000" is displayed in the user mode.

• ADJ CONVER (STD, CUSTOM 1, CUSTOM 2)

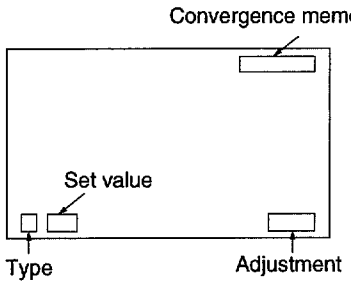


Fig. 8-3

(*1):
The convergence memory (STD, CUSTOM 1, CUSTOM 2) is set using the CONVERGENCE MEMORY key of this unit in the factory ADJ mode OFF state.

• Type

GH (Green, horizontal)
↓
GV (Green, vertical)
↓
BH (Blue, horizontal)
↓
BV (Blue, vertical)
↓
RH (Red, horizontal)
↓
RV (Red, vertical)

By pressing the CHANNEL [+] key continuously, convergence will be switched as above. When the [−] key is pressed, convergence will be switched in the reverse order of the above.

• Set value
Adjust by pressing the VOL [+], [−] keys or ADJUSTMENT ◀, ▶ keys.

• Adjustment (Corresponds to numerical key)
[1] : STATIC (*1)
[2] : SIZE
[3] : LIN
[4] : SKEW
[5] : KEY
[6] : SUB KEY
[7] : BOW
[8] : PIN
[9] : SUB PIN

(*1) : STATIC is not displayed for GH and GV.

• Adjustments are divided minutely into the following steps in ADJ CONVER for users, enabling the convergence to be adjusted more minutely.

• Adjustment (Corresponds to numerical key)

[1] : STATIC (*2)

[2] : SIZE → MID SIZE → 5D SIZE (*3) → SIZE
[3] : LIN → MID LIN → 6D LIN (*3) → LIN
[4] : SKEW → 3D SKEW → 5D SKEW (*3) → SKEW
[5] : KEY → MID KEY → 3D KEY → MID 3D KEY (*3) → KEY
[6] : SUB KEY → MID SUB KEY → 3D SUB KEY (*3) → M3DSUB KEY (*3) → SUB KEY
[7] : BOW → 4D BOW → 6D BOW (*3) → BOW
[8] : PIN → MID PIN → 4D PIN → M4D PIN → PIN
[9] : SUB PIN → MID SUB PIN → 4D SUB PIN (*3) → M4D SUB PIN (*3) → SUB PIN

(*2):STATIC is not displayed for GH and GV.
(*3):Not displayed for GH.

8.4.2 Green Line Adjustment

- As the green line serves as the reference line during the adjustment of red and blue, adjust it accurately.
- Adjust using the VOL [+], [−] keys or ADJUSTMENT ◀, ▶ keys of the remote control unit.
- Adjust the convergence of the green line using only green.

• Horizontal Correction Adjustment of Green Line

Step	Adjustment	Adjusting Method
1	GH-SKEW	Refer to Fig. 8-4, and adjust the vertical green lines at the center so that they become straight.
2	GH-BOW	
3	Repeat steps 1 and 2.	
4	GH-SIZE	Refer to Fig. 8-4, and adjust so that the distances between the vertical green lines become equal, and the horizontal size becomes 91%±2%.
5	GH-MID SIZE	
6	GH-LIN	
7	GH-MID LIN	
8	Repeat steps 4 to 7.	
9	GH-KEY	Refer to Fig. 8-4 and Fig. 8-5, and adjust so that the left and right vertical green lines of the screen are not slanting.
10	GH-MID KEY (Note 1)	
11	GH-SUB KEY	
12	GH-MID SUB KEY (Note 1)	
13	Repeat steps 9 to 12.	
14	GH-PIN	Refer to Fig. 8-4 and 8-5, and adjust so that the left and right vertical green lines of the screen become straight.
15	GH-MID PIN (Note 1)	
16	GH-SUB PIN	
17	GH-MID SUB PIN (Note 1)	
18	GH-3D KEY	
19	GH-4D PIN	
20	Repeat steps 14 to 19.	

Note 1 : Adjust mainly the vertical green lines of 1/4 area from the left and right of the screen.

• **Vertical Correction Adjustment of Green Line**

Step	Adjustment	Adjusting Method
1	GV-SKEW	Refer to Fig. 8-6, and adjust the horizontal green lines at the center so that they become straight.
2	GV-BOW	
3	GV-3D SKEW	
4	GV-4D BOW	
5	GV-5D SKEW	
6	GV-6D BOW	
7	Repeat steps 1 to 6.	
8	GV-SIZE	Refer to Fig. 8-6, and adjust so that the distances between the horizontal green lines become equal, and the vertical size becomes 90%±3%.
9	GV-LIN	
10	GV-MID SIZE	
11	GV-MID LIN	
12	GV-5D SIZE	
13	GV-6D LIN (PIN) *1	
14	Repeat steps 8 to 13.	
15	GV-KEY	Refer to Fig. 8-6 and Fig. 8-7, and adjust so that the top and bottom horizontal green lines of the screen are not slanting.
16	GV-MID KEY (Note 2)	
17	GV-SUB KEY	
18	GV-MID SUB KEY (Note 2)	
19	Repeat steps 15 to 18.	
20	GV-3D KEY	Refer to Figs. 8-6 and 8-7, and adjust so that the top and bottom horizontal green lines of the screen become straight.
21	GV-MID 3D KEY (Note 2)	
22	GV-3D SUB KEY	
23	GV-M3D SYB KEY (Note 2)	
24	GV-PIN	
25	GV-MID PIN (Note 2)	
26	GV-4D PIN	
27	GV-M4D PIN (Note 2)	
28	GV-SUB PIN	
29	GV-MID SUB PIN (Note 2)	
30	GV-4D SUB PIN	
31	GV-M4D SUB PIN (Note 2)	
32	Repeat steps 20 to 31.	

*1 : The screen is 6D LIN, which serves as PIN.

Note 2 : Adjust mainly the horizontal green lines of 1/4 area from the left and right of the screen.

8.4.3 Red Line Adjustment

- Adjust the convergence of the red line using the green and red lines.
- Adjust using the VOL [+], [−] keys or ADJUSTMENT ◀, ▶ keys of the remote control unit so that the green line overlaps with the red line to become yellow.
- After completing the adjustments, finely adjust the whole screen.

• Horizontal Correction Adjustment of Red Line

Step	Adjustment	Adjusting Method
1	RH-STATIC	Refer to Fig. 8-4, and adjust the green center to the red center.
2	RH-SKEW	Refer to Fig. 8-4, and adjust so that the vertical red lines at the center overlap with the vertical green lines.
3	RH-BOW	
4	RH-3D SKEW	
5	RH-4D BOW	
6	RH-5D SKEW	
7	RH-6D BOW (SUB KEY) *2	
8	Repeat steps 2 to 7.	
9	RH-SIZE	Refer to Fig. 8-4, and adjust so that the distance between the vertical green lines match the distance between the vertical red lines at the center.
10	RH-LIN	
11	RH-MID SIZE	
12	RH-MID LIN	
13	RH-5D SIZE	
14	RH-6D LIN	
15	Repeat steps 9 to 14.	
16	RH-KEY	Refer to Fig. 8-4 and Fig. 8-5, and adjust so that the top and bottom vertical red lines of the screen are not slanting.
17	RH-MID KEY (Note 3)	
18	RH-SUB KEY	
19	RH-MID SUB KEY (Note 3)	
20	Repeat steps 16 to 19.	
21	RH-3D KEY	Refer to Fig. 8-4 and 8-5, and adjust so that the top and bottom vertical red lines of the screen overlap with the vertical green lines and become straight.
22	RH-MID 3D KEY (Note 3)	
23	RH-3D SUB KEY	
24	RH-M3D SUB KEY (Note 3)	
25	RH-PIN	
26	RH-MID PIN (Note 3)	
27	RH-4D PIN	
28	RH-M4D PIN (Note 3)	
29	RH-SUB PIN	
30	RH-MID SUB PIN (Note 3)	
31	RH-4D SUB PIN	
32	RH-M4D SUB PIN (Note 3)	
33	Repeat steps 21 to 32.	

*2 : The screen is 6D BOW, which serves as SUB KEY.
(Note 3) : Adjust mainly the vertical red lines of 1/4 area from the left and right of the screen.

• **Vertical Correction Adjustment of Red Line**

Step	Adjustment	Adjusting Method
1	RV-STATIC	Refer to Fig. 8-6, and adjust the green center to the red center.
2	RV-SKEW	Refer to Fig. 8-6, and adjust so that the horizontal red lines at the center overlap with the horizontal green lines.
3	RV-BOW	
4	RV-3D SKEW	
5	RV-4D BOW	
6	RV-5D SKEW	
7	RV-6D BOW	
8	Repeat steps 2 to 7.	
9	RV-SIZE	Refer to Fig. 8-6, and adjust so that the distance between the horizontal green lines match the distance between the horizontal red lines at the center.
10	RV-LIN	
11	RV-MID SIZE	
12	RV-MID LIN	
13	RV-5D SIZE	
14	RV-6D LIN (PIN) *1	
15	Repeat steps 9 to 14.	
16	RV-KEY	Refer to Fig. 8-6 and Fig. 8-7, and adjust so that the left and right horizontal red lines of the screen are not slanting.
17	RV-MID KEY (Note 4)	
18	RV-SUB KEY	
19	RV-MID SUB KEY (Note 4)	
20	Repeat steps 16 to 19.	
21	RV-3D KEY	Refer to Fig. 8-6 and 8-7, and adjust so that the left and right horizontal red lines of the screen overlap with the horizontal green lines and become straight.
22	RV-MID 3D KEY (Note 4)	
23	RV-3D SUB KEY	
24	RV-M3D SUB KEY (Note 4)	
25	RV-PIN	
26	RV-MID PIN (Note 4)	
27	RV-4D PIN	
28	RV-M4D SUB KEY (Note 4)	
29	RV-SUB PIN	
30	RV-MID SUB PIN (Note 4)	
31	RV-4D SUB PIN	
32	RV-M4D SUB PIN (Note 4)	
33	Repeat steps 21 to 32.	

*1 : The screen is 6D LIN, which serves as PIN.

Note 1 : Adjust mainly the horizontal red lines of 1/4 area from the left and right of the screen.

8.4.4 Blue Line Adjustment

- Adjust the convergence of the blue line using the green and blue lines.
- Adjust using the VOL [+], [−] keys or ADJUSTMENT ◀, ▶ keys of the remote control unit so that the blue line overlaps with the green line to become cyan.
- After completing the adjustments, finely adjust the whole screen.

• Horizontal Correction Adjustment of Blue Line

Step	Adjustment	Adjusting Method
1	BH-STATIC	Refer to Fig. 8-4, and adjust the blue center to the green center.
2	BH-SKEW	Refer to Fig. 8-4, and adjust so that the vertical blue lines at the center overlap with the vertical green lines.
3	BH-BOW	
4	BH-3D SKEW	
5	BH-4D BOW	
6	BH-5D SKEW	
7	BH-6D BOW (SUB KEY) *2	
8	Repeat steps 2 to 7.	
9	BH-SIZE	Refer to Fig. 8-4, and adjust so that the distance between the vertical blue lines match the distance between the vertical green lines at the center.
10	BH-LIN	
11	BH-MID SIZE	
12	BH-MID LIN	
13	BH-5D SIZE	
14	BH-6D LIN	
15	Repeat steps 9 to 14.	
16	BH-KEY	Refer to Fig. 8-4 and Fig. 8-5, and adjust so that the top and bottom vertical blue lines of the screen are not slanting.
17	BH-MID KEY (Note 5)	
18	BH-SUB KEY	
19	BH-MID SUB KEY (Note 5)	
20	Repeat steps 16 to 19.	
21	BH-3D KEY	Refer to Fig. 8-4 and 8-5, and adjust so that the top and bottom vertical blue lines of the screen overlap with the vertical green lines and become straight.
22	BH-MID 3D KEY (Note 5)	
23	BH-3D SUB KEY	
24	BH-M3D SUB KEY (Note 5)	
25	BH-PIN	
26	BH-MID PIN (Note 5)	
27	BH-4D PIN	
28	BH-M4D PIN (Note 5)	
29	BH-SUB PIN	
30	BH-MID SUB PIN (Note 5)	
31	BH-4D SUB PIN	
32	BH-M4D SUB PIN (Note 5)	
33	Repeat steps 21 to 32.	

*2 : The screen is 6D BOW, which serves as SUB KEY.
(Note 5) : Adjust mainly the vertical blue lines of 1/4 area from the left and right of the screen.

• **Vertical Correction Adjustment of Blue Line**

Step	Adjustment	Adjusting Method
1	BV-STATIC	Refer to Fig. 8-6, and adjust the blue center to the green center.
2	BV-SKEW	Refer to Fig. 8-6, and adjust so that the horizontal blue lines at the center overlap with the horizontal green lines.
3	BV-BOW	
4	BV-3D SKEW	
5	BV-4D BOW	
6	BV-5D SKEW	
7	BV-6D BOW	
8	Repeat steps 2 to 7.	
9	BV-SIZE	Refer to Fig. 8-6, and adjust so that the distance between the horizontal green lines match the distance between the horizontal blue lines at the center.
10	BV-LIN	
11	BV-MID SIZE	
12	BV-MID LIN	
13	BV-5D SIZE	
14	BV-6D LIN (PIN) *1	
15	Repeat steps 9 to 14.	
16	BV-KEY	Refer to Fig. 8-6 and Fig. 8-7, and adjust so that the left and right horizontal blue lines of the screen are not slanting.
17	BV-MID KEY (Note 6)	
18	BV-SUB KEY	
19	BV-MID SUB KEY (Note 6)	
20	Repeat steps 16 to 19.	
21	BV-3D KEY	Refer to Fig. 8-6 and 8-7, and adjust so that the left and right horizontal blue lines of the screen overlap with the horizontal green lines and become straight.
22	BV-MID 3D KEY (Note 6)	
23	BV-3D SUB KEY	
24	BV-M3D SUB KEY (Note 6)	
25	BV-PIN	
26	BV-MID PIN (Note 6)	
27	BV-4D PIN	
28	BV-M4D PIN (Note 6)	
29	BV-SUB PIN	
30	BV-MID SUB PIN (Note 6)	
31	BV-4D SUB PIN	
32	BV-M4D SUB PIN (Note 6)	
33	Repeat steps 21 to 32.	

*1 : The screen is 6D LIN, which serves as PIN.
(Note 6) : Adjust mainly the horizontal blue lines of 1/4 area from the left and right of the screen.

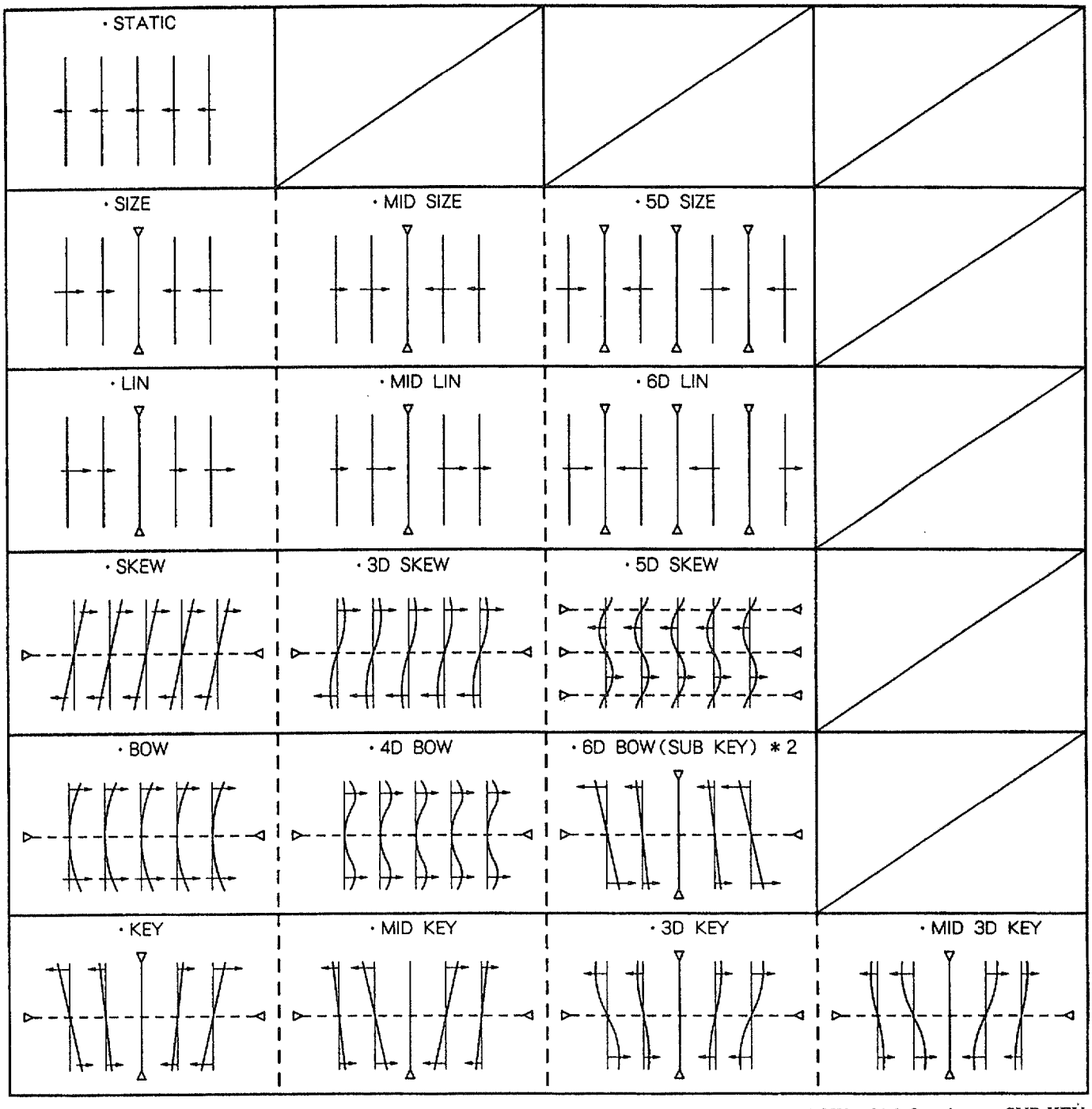
- Finally, input all colors and check that red and blue lines overlap with green lines. If not, finely adjust them.

Note : When green lines are adjusted, all colors (green, red, blue) move in the same way at the same time for the following items.

- GH-SIZE
- GH-KEY
- GH-PIN
- GH-3D KEY
- GH-4D PIN
- GV-SIZE
- GV-LIN
- GV-MID SIZE

• Manual Convergence Adjustment (Horizontal Direction)

The following arrow direction indicates when the VOL [+] keys or ADJUSTMENT ▶ keys are used.
The arrow direction reverses for the VOL [−] keys or ADJUSTMENT ◀ keys.



= Standard position

*2 : The screen is 6D BOW, which functions as SUB KEY.

Fig. 8-4. Horizontal Correction (1)

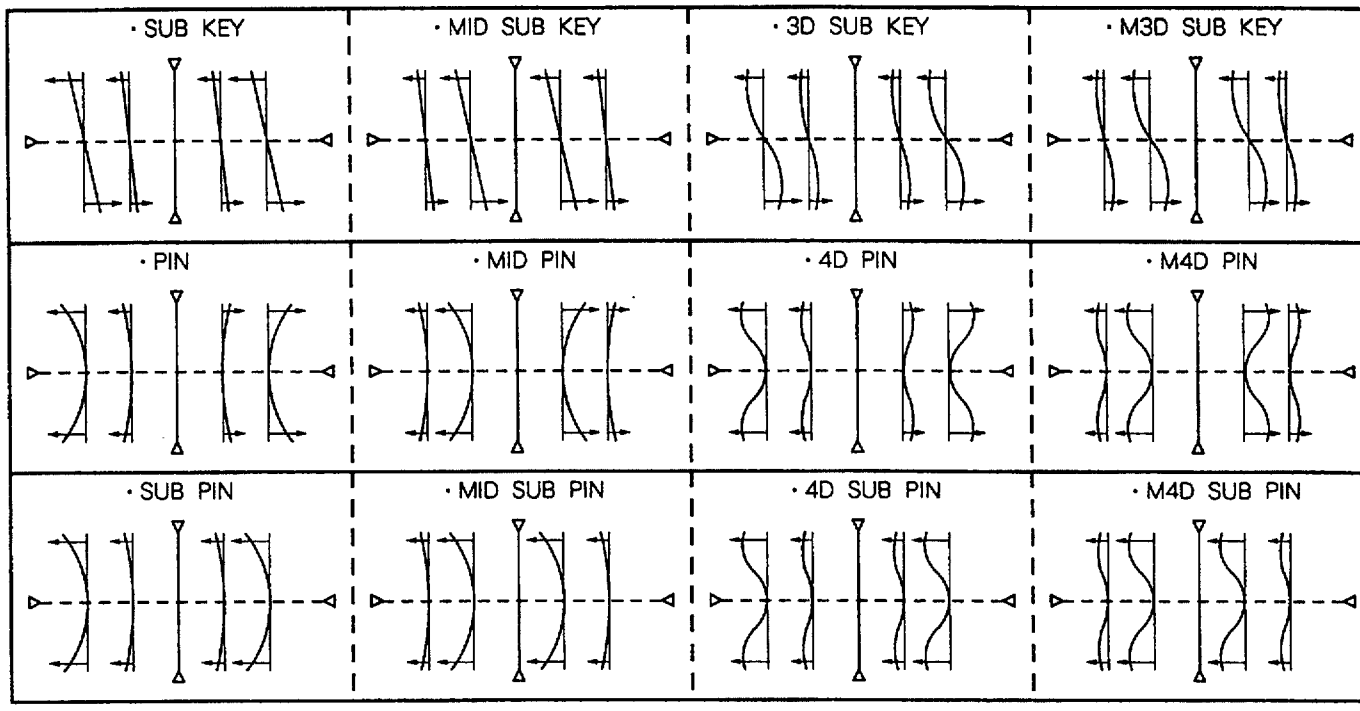
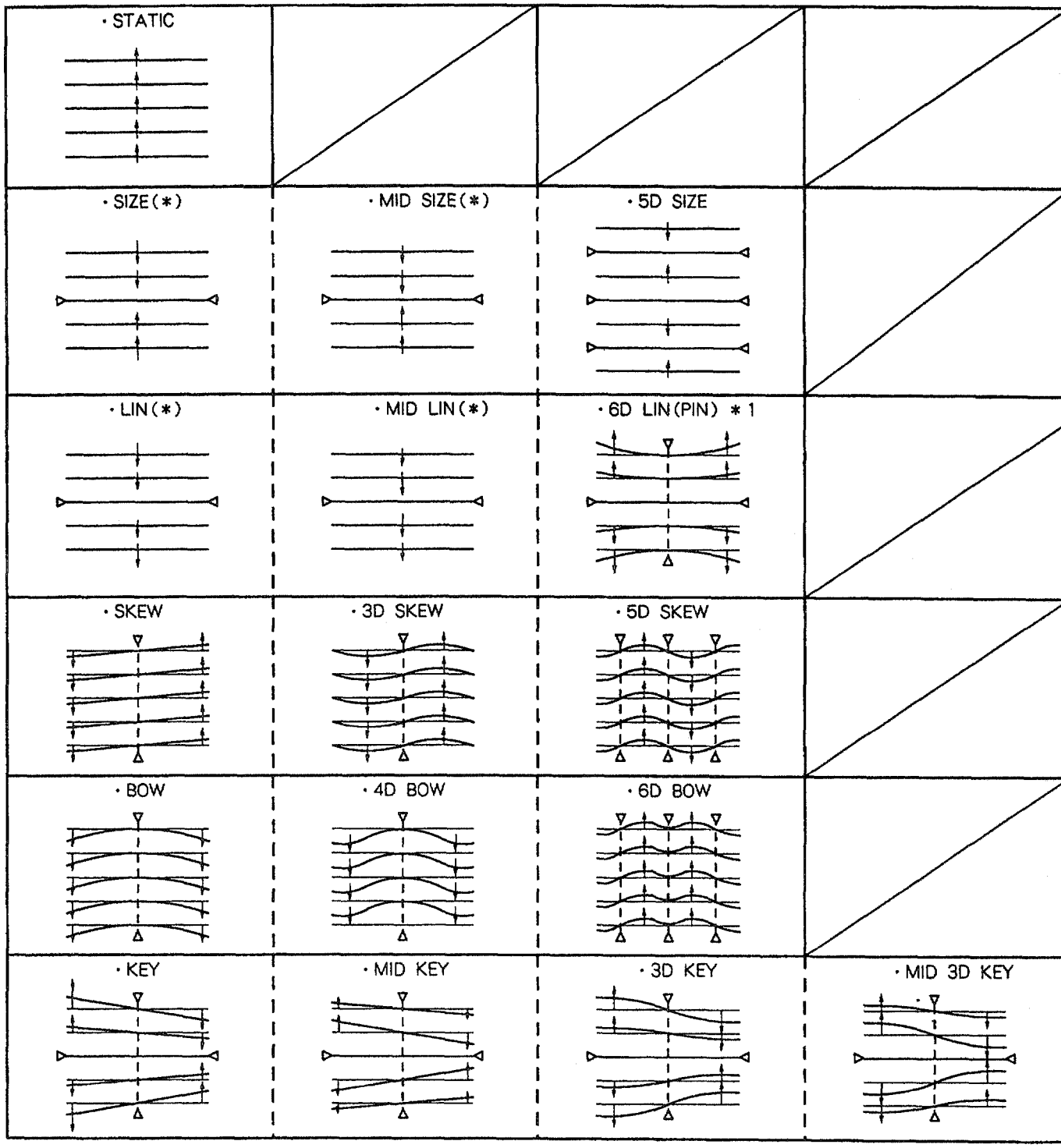


Fig. 8-5. Horizontal Correction (2)

• Manual Convergence Adjustment (Vertical Direction)

The following arrow direction indicates when the VOL [+] keys or ADJUSTMENT ◀ keys are used.
The arrow direction reverses for the VOL [−] keys or ADJUSTMENT ▶ keys.

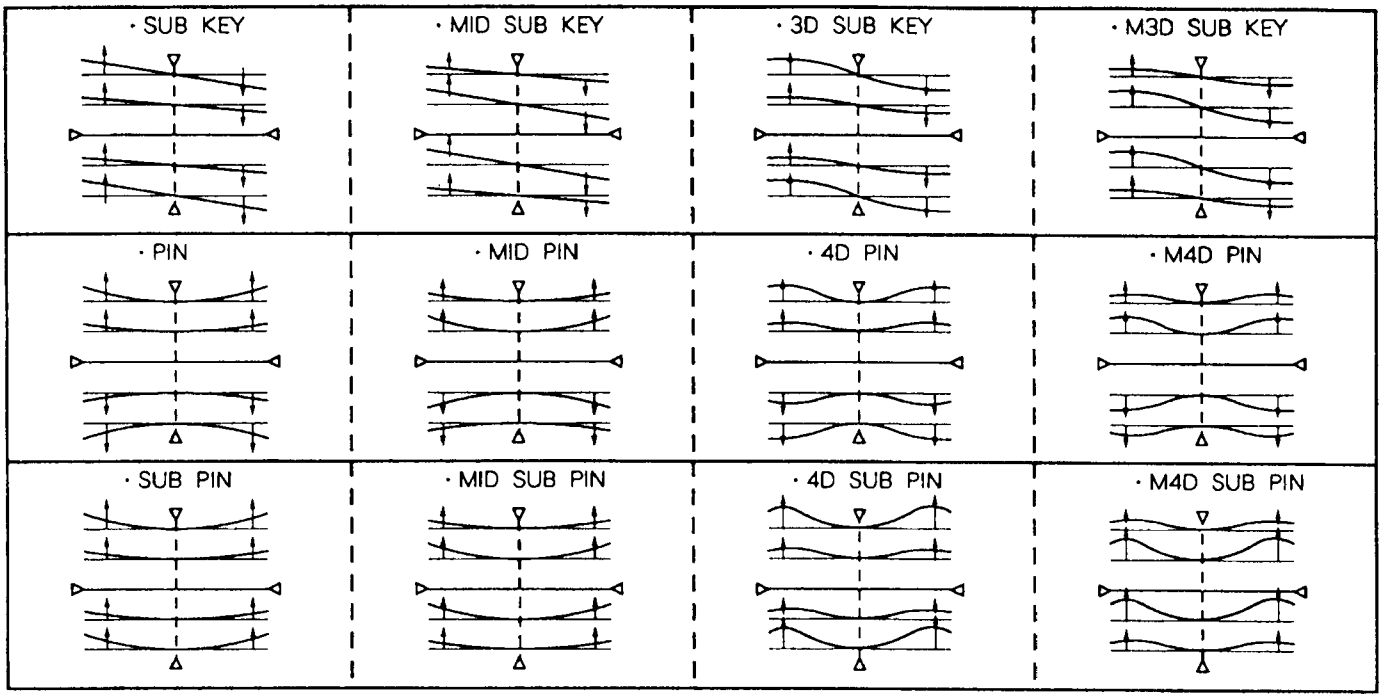


= Standard position

(*)=Arrow direction is reverse only for green

*1 : The screen is 6D LIN, which functions as PIN.

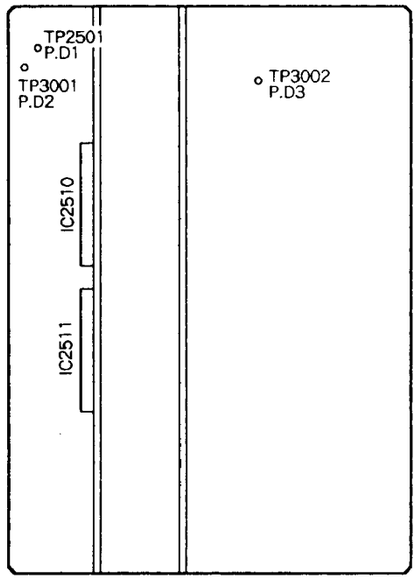
Fig. 8-6. Vertical Correction (1)



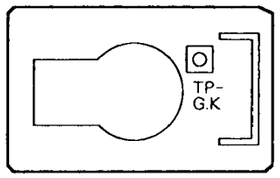
= Standard position

Fig. 8-7. Vertical Correction (2)

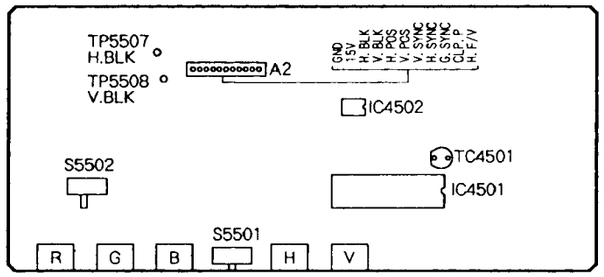
Ⓐ **CONVERGENCE ASSY**



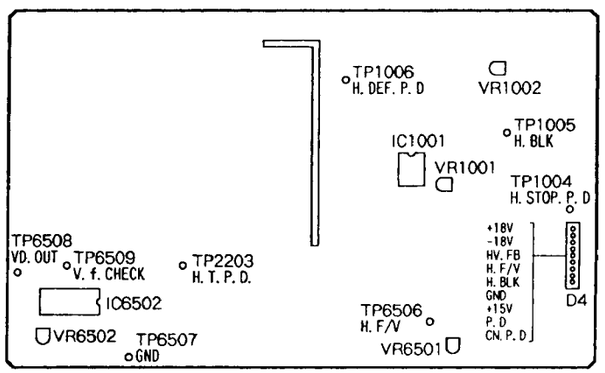
Ⓑ **G. CRT DRIVE ASSY**



Ⓒ **U-COM ASSY**



Ⓓ **DEFLECTION ASSY**



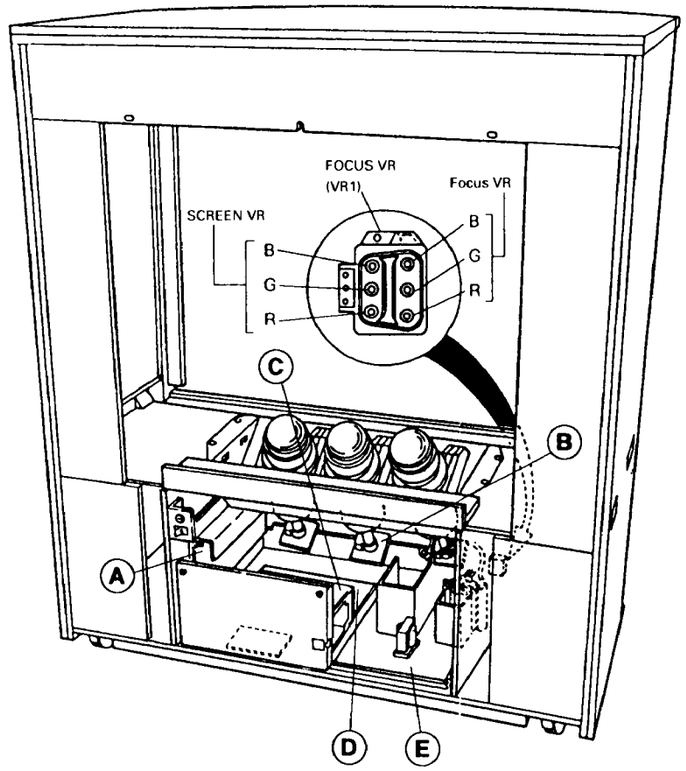
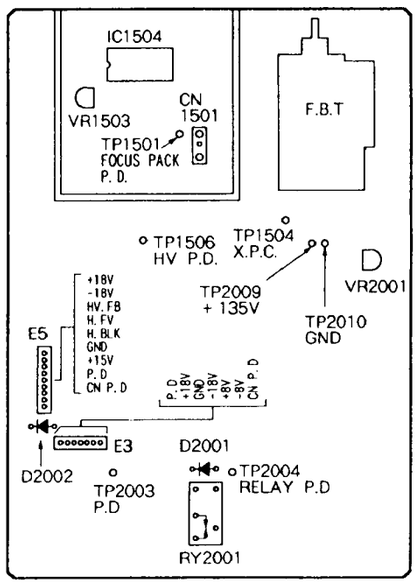


Fig. 8-8. Adjusting Points (1)

Ⓔ **HIGH VOLTAGE ASSY**



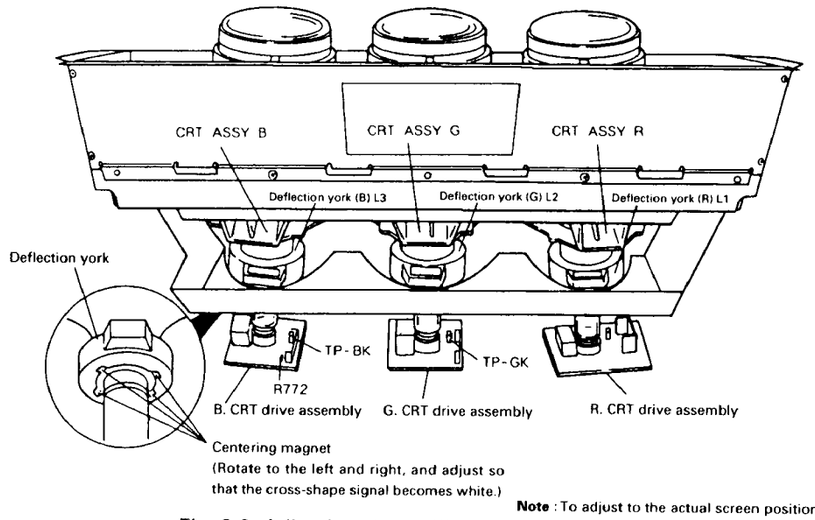


Fig. 8-9. Adjusting Points (2)

Note : To adjust to the actual screen position, place spacers of about 5 mm in thickness and attach the semi-transparent paper such as tracing paper. Use spacers with the same thickness for the left and right sides.

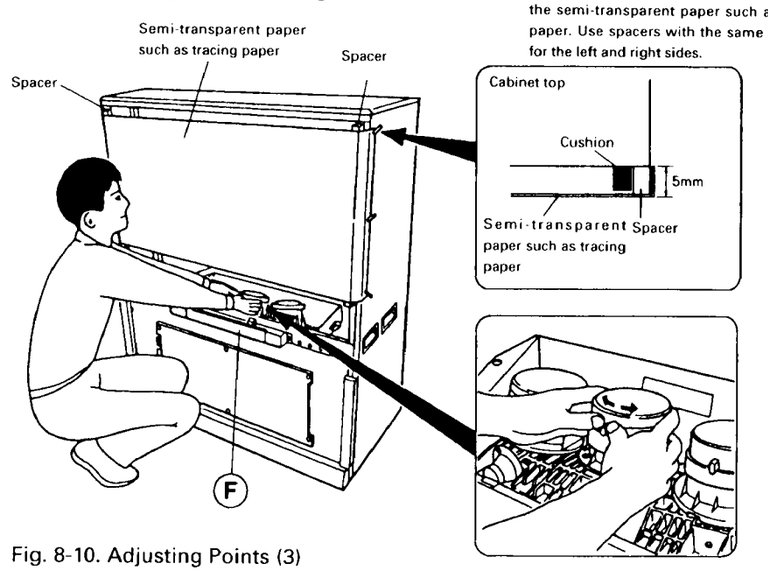
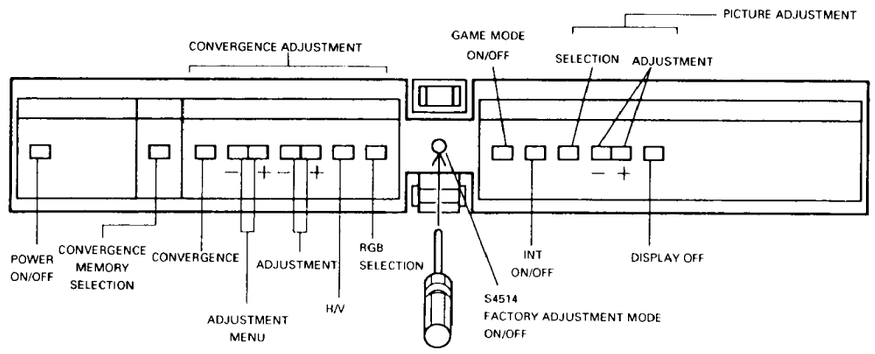


Fig. 8-10. Adjusting Points (3)

Ⓕ **FRONT CONTROL SECTION**



9. REPLACING THE CRT ASSY

Serviceman Warning
When replacing the CRT assy,turn off the power,unplug the AC plug and let the unit discharge for more than 1 minute.

The anode cables of the CRT assy R,G and B in PROJECTION MONITOR RECEIVER are connected in series as shown in Fig. 1. When repracing the CRT assy,the anode cable have to be cut.

Note:
Since the anode cables for the CRT assy to service supplies are only available in half lengths,either cut longer lengths, or join older lengths of cable to ensure that the original cable length is used.

Table 1 Cable disconnecting methods

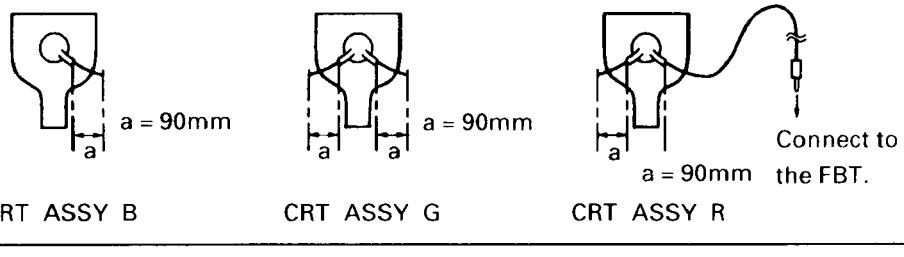
Cable	Replacement CRT assy		
	When CRT assy B is replaced	When CRT assy G is replaced	When CRT assy R is replaced
Cable ⓐ	—	—	Disconnect the anode cable from the FBT. (Refer to "8.3 ANODE VOLTAGE MEASURING METHOD")
Cable ⓑ	Leave it as is.	Cut a place 20mm from the exact center towards the CRT assy G.	Cut a place 20mm from the exact center towards the CRT assy R.
Cable ⓒ	Cut a place 20mm from the exact center towards the CRT assy B.	Cut a place 20mm from the exact center towards the CRT assy G.	Leave it as is.

Note: Do not cut other cables by mistake.

■ WHEN REPLACING THE CRT ASSY

Unplug the AC plug and let the unit discharge for more than 1 minute,then cut the anode cable according to Table 1.

Each CRT assy supplied as a spare part is as shown below.



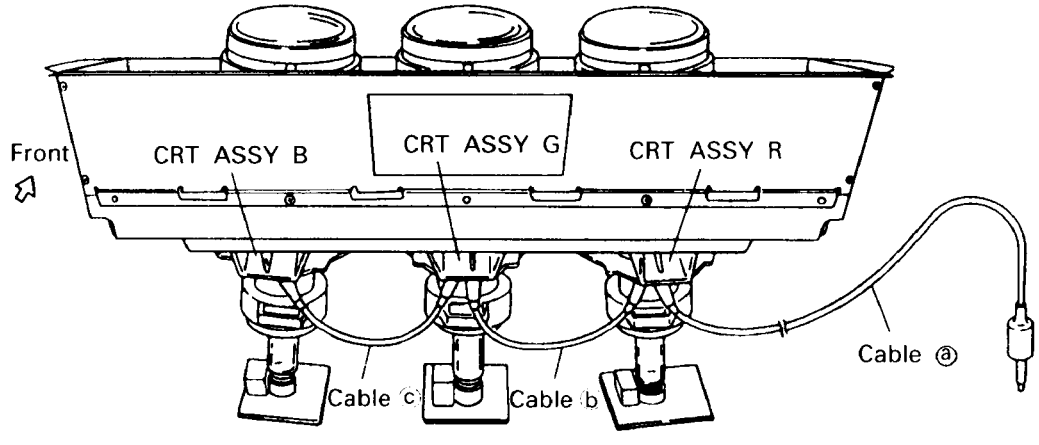
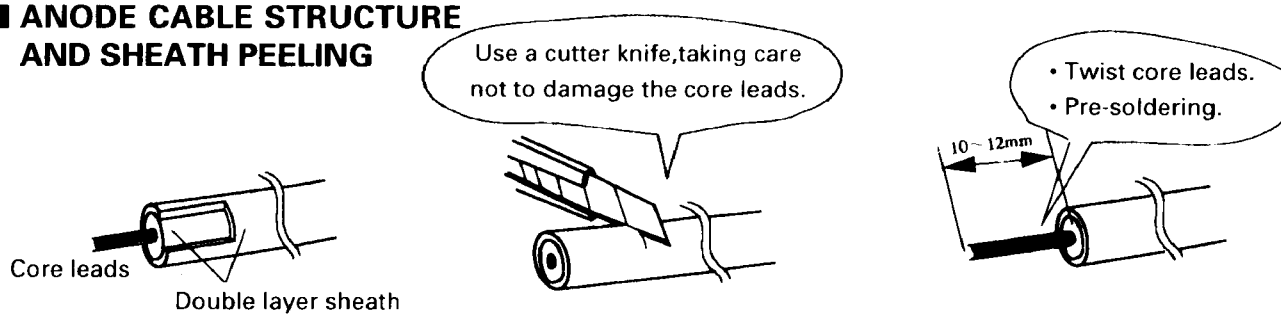


Fig. 1 Connection diagram of the CRT assemblies

■ ANODE CABLE STRUCTURE AND SHEATH PEELING

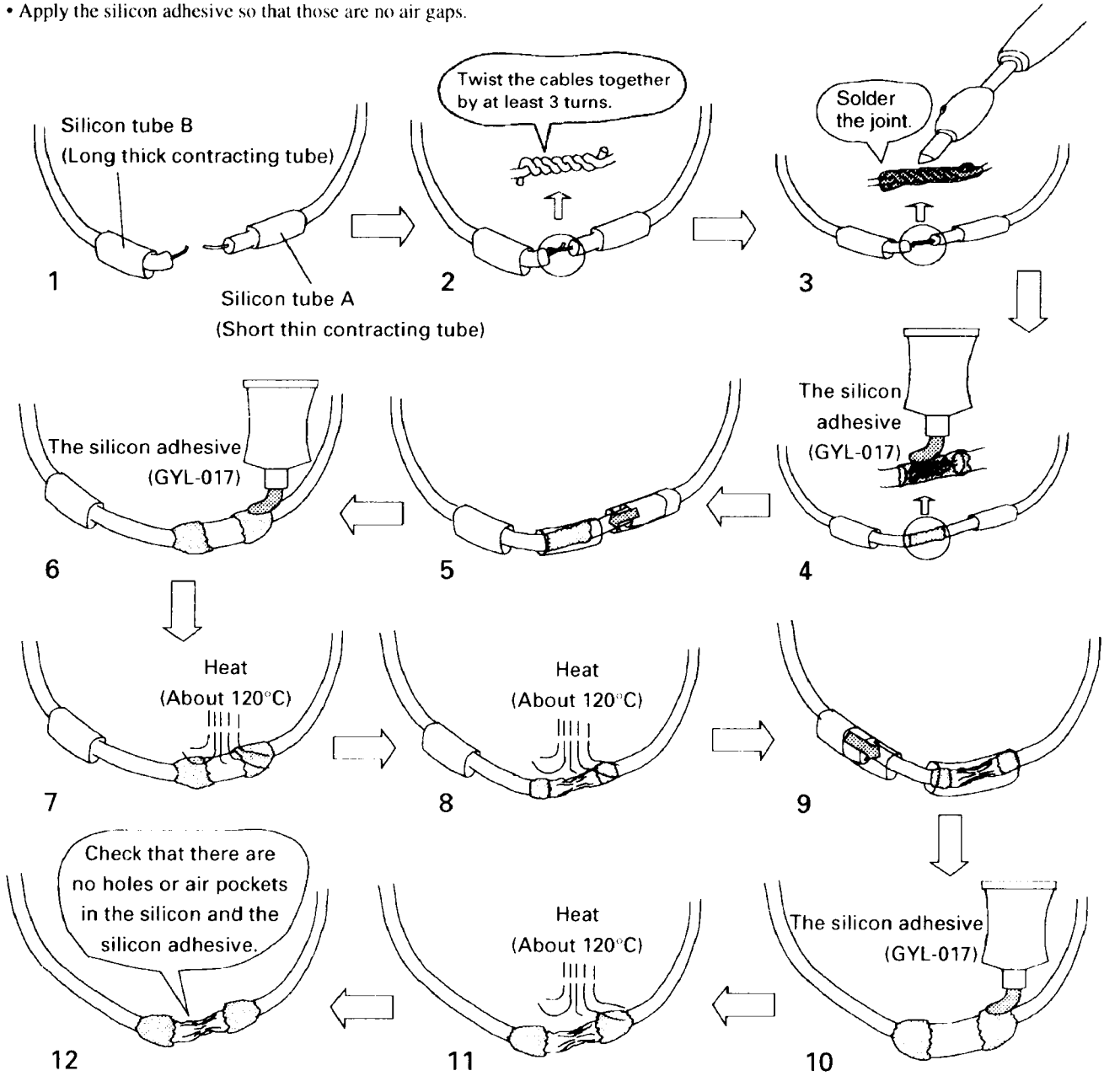


■ ANODE CABLE JOINING PROCEDURE

(The silicon tube is packed with CRT ASSY. For the silicon adhesive,be sure to use silicon adhesive part number GYL-017.)

●**CAUTION** When connecting the anode cable, pay attention to the following.

- Take care not damage the anode cable sheath.
- Insulate the cable core leads from other parts using the silicon adhesive and the silicon tube.
- Apply the silicon adhesive so that those are no air gaps.



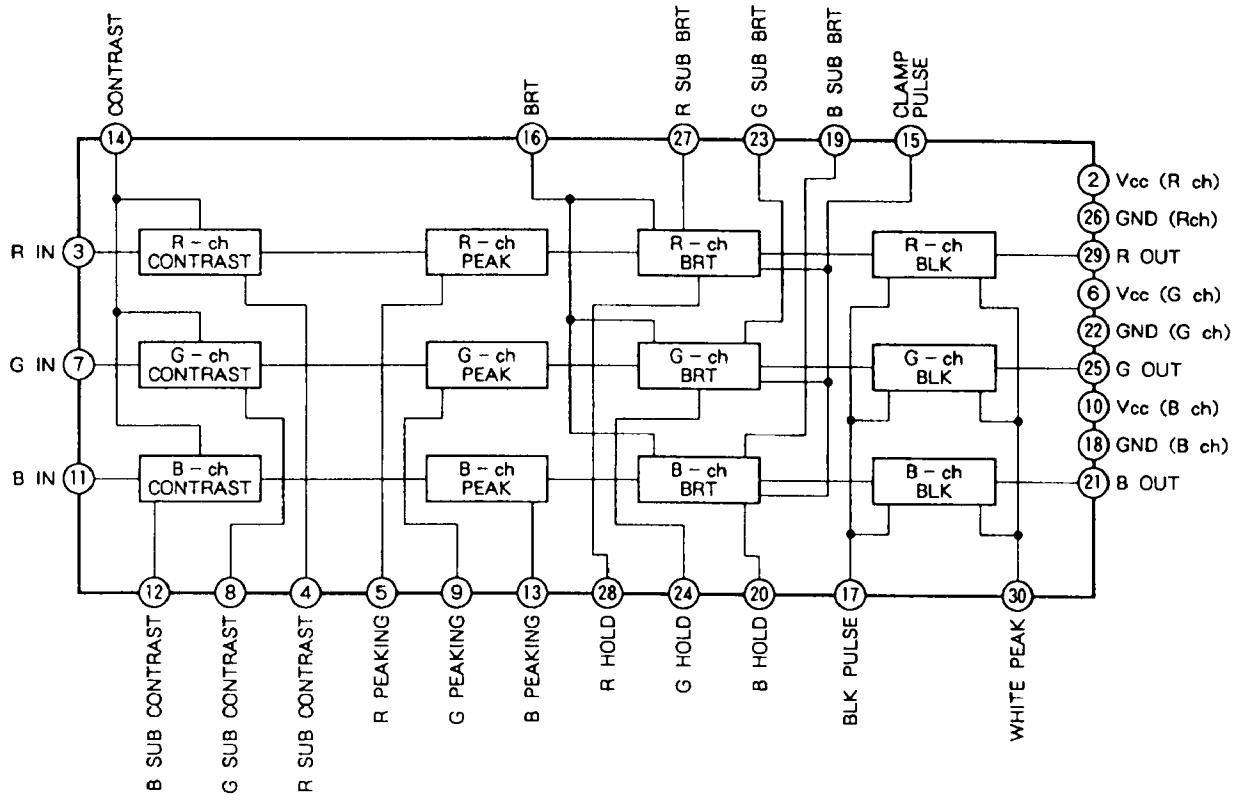
10. IC INFORMATION

• The information shown in the list is basic information and may not correspond exactly to that shown in the schematic diagrams.

■ M51387P (U-COM ASSY : IC5501)

• 3-channel video amplifier

● Block Diagram



● Pin Function

No.	Pin Name	Pin Function
1	NC	Not used
2	Vcc (R ch)	R ch Vcc pin
3	R IN	R signal input pin
4	R SUB CONTRAST	R ch sub contrast control pin
5	R PEAKING	R ch peaking pin
6	Vcc (G ch)	G ch Vcc pin
7	G IN	G signal input pin
8	G SUB CONTRAST	G ch sub contrast control pin
9	G PEAKING	G ch peaking pin
10	Vcc (B ch)	B ch Vcc pin
11	B IN	B signal input pin
12	B SUB CONTRAST	B ch sub contrast control pin
13	B PEAKING	B ch peaking pin
14	CONTRAST	Main contrast control pin

No.	Pin Name	Pin Function
15	CLAMP PULSE	Clamp pulse input pin
16	BRT	Main bright control pin
17	BLK PULSE	Blanking pulse input pin
18	GND (B ch)	B ch GND pin
19	B SUB BRT	B ch sub bright control pin
20	B HOLD	B ch hold pin
21	B OUT	B ch output pin
22	GND (G ch)	G ch GND pin
23	G SUB BRT	G ch sub bright control pin
24	G HOLD	G ch hold pin
25	G OUT	G ch output pin
26	GND (R ch)	R ch GND pin
27	R SUB BRT	R ch sub bright control pin
28	R HOLD	R ch hold pin
29	R OUT	R ch output pin
30	WHITE PEAK	White peak clip pin

■ PD5235B (U-COM ASSY : IC4501)

• TV Control Microprocessor

● Pin Function

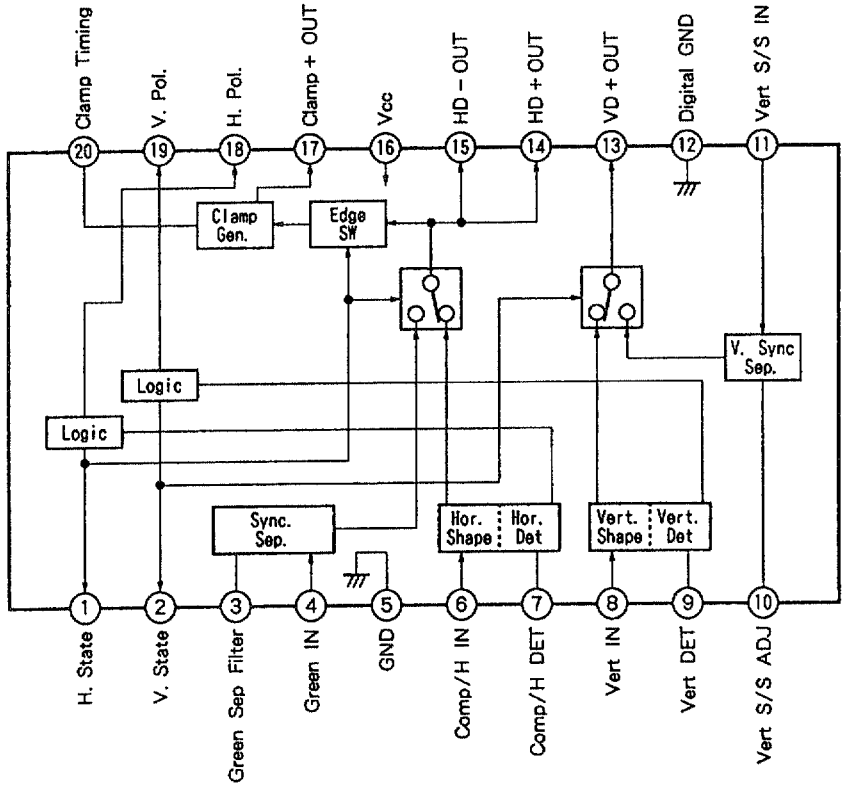
No.	Pin Name	I/O	Function
1	OSC1	I	Display clock input
2	OSC2	O	Display clock output
3	KEYIN	I	Key scan signal (PD5136 format) input
4	NOT USED	AD	(PULL DOWN)
5	REMIN	I	Remote control signal (SR format) input
6	NOT USED	O	(NO CONNECT)
7	CONTRAST	N	Contrast level control PWM output
8	BRIGHT	N	Bright level control PWM output
9	H POSI	N	Screen horizontal position control PWM output
10	V POSI	N	Screen vertical position control PWM output
11	R GAIN	N	RED signal level control PWM output
12	B GAIN	N	BLUE signal level control PWM output
13	NOT USED	I	(PULL DOWN)
14	NOT USED	I	(PULL DOWN)
15	HS IN	I	H SYNC input. Used for counting number of scanning lines Counter reset during V SYNC interruption.
16	AC CLOCK	I	AC clock detection input Used for detecting of main power OFF. Software is reset when no AC clock for 100msec
17	CONVMUTE	O	Digital-analog convergence mute output Outputs mute signal to end of convergence data transmission immediately after power is turned ON
18	CONV ENB	O	Digital-analog convergence chip enable output
19	NOT USED	I	(PULL DOWN)
20	NOT USED	I	(PULL DOWN)
21	I2CSCLK	O	Clock output for I2C bus control
22	I2CSDAT	I/O	Data input/output for I2C bus control
23	NOT USED	I	(PULL DOWN)
24	NOT USED	I	(PULL DOWN)
25	SCLK	O	Serial clock output. Used for digital-analog convergence IC control
26	SOUT	O	Serial data output. Used for digital-analog convergence IC control
27	VSS	I	GND
28	NC	O	Clock output for multi chip. Set to OPEN
29	RESET	I	System reset input. By inputting "L" for more than 0.95 µsec (OSC=4.19 MHz), this microprocessor will be reset
30	XIN	I	Oscillation pins for generating system clocks Connected to 4.19 MHz ceramic oscillator
31	XOUT	O	
32	VSS	I	GND
33	RELAY	O	Power supply relay control signal output Power supply ON: L Power supply OFF: H
34	INTER	O	Interlace mode control signal output INTERLACE OFF: L INTERLACE ON: H
35	NOT USED	I	(PULL DOWN)
36	NOT USED		
37	NOT USED		
38	NOT USED		
39	NOT USED		
40	NOT USED		
41	NOT USED		
42	NOT USED		
43	NOT USED		
44	NOT USED		
45	NOT USED		
46	NOT USED		
47	NOT USED		
48	NOT USED		
49	NOT USED		
50	NOT USED		
51	LEVEL2	O	Input signal level attenuator control signal output ATT. LEVEL / LOW / MID / HIGH LEVEL1: H / H / L LEVEL2: H / L / L
52	LEVEL1		
53	B BLK	O	BLUE CRT mute control output for digital-analog convergence adjustment
54	G BLK	O	GREEN CRT mute control output for digital-analog convergence adjustment
55	R BLK	O	RED CRT mute control output for digital-analog convergence adjustment
56	V MUTE	O	CRT MUTE output for power supply ON/OFF
57	BLK OUT	O	VIDEO MUTE output
58	NOT USED	O	(NO CONNECT)
59	B	O	BLUE background signal output
60	G	O	GREEN background signal output
61	R	O	RED background signal output
62	VSYNC	I	Background display V SYNC input
63	HSYNC	I	Background display H SYNC input
64	VCC	I	+5V

Note: I: CMOS input N: N ch open drain output
O: MOS output AD: Analog voltage input

■ M52036SP (DEFLECTION ASSY : IC6501)

• Sync signal processing IC

● Block Diagram



● Pin Function

No.	Pin Name	Pin Function
1	H. State	Horizontal sync signal logic output pin. Pin 6 input signal is "H" when Posi, "L" when Non, and "H" when Neg.
2	V. State	Vertical sync signal logic output pin. Pin 6 input signal is "H" when Posi, "L" when Non, and "H" when Neg.
3	Green Sep Filter	Green (Video) Sep Filter pin. Self-bias according to time constant of external CR. R is a discharge resistor to enhance response of self-bias circuit. When resistance is small, self-boas circuit gain is also small.
4	Green IN	Green (Sync on Video) input pin. Inputs Green (Sync on Video) signal when C is combined. Sync is negative polarity.
5	GND	GND.
6	Comp/H IN	Composite sync/H sync input pin. Bias is approx. 6V, and impedance is 10 kΩ. Waveform-shaping and polarity detection are performed by internal double threshold comparator. The optimum input amplitude is approx. 1.5 Vp-p, enabling waveform-shaping and polarity detection to about 50% duty.
7	Comp/H DET	External capacity is required as filter pin for polarity detection and no-signal detection. The larger the value, the smaller the ripple, and incorrect operations. But detection response speed will be slower.
8	Vert IN	V sync input pin. Same as Pin 6.

No.	Pin Name	Pin Function
9	Vert DET	Same as Pin 7.
10	Vert S/S ADJ	Vert S/S ADJ pin. When no external adjustment, threshold value is approx. 1V.
11	Vert S/S IN	Vert S/S IN pin. Signal obtained by externally integrating composite sync is input for V sync separation.
12	Digital GND	GND
13	VD + OUT	VD+pulse output pin. Open-collector output type. Output amplitude can be varied. Approx. 6 mA can be input.
14	HD + OUT	HD + pulse output pin. Same as Pin 13.
15	HD – OUT	HD – pulse output pin. Same as Pin 13.
16	Vcc	Power supply
17	Clamp + OUT	Clamp + pulse output pin. Same as Pin 13.
18	H. Pol.	Horizontal sync signal logic output pin. Pin 6 input signal is "H" when Posi, "L" when Non, and "H" when Neg.
19	V. Pol.	Vertical sync signal logic output pin. Pin 8 input signal is "H" when Posi, "L" when Non, and "H" when Neg.
20	Clamp Timing	Clamp timing pin. Clamp pulse width is determined by external CR. When CR is increased, clamp pulse width also increases.

■ UPC1377C (DEFLECTION ASSY : IC1004)

• Color TV Deflection Signal Processing IC

● Pin Function

No.	Pin Function	No.	Pin Function
1	Horizontal sync separation input	12	Vertical blanking pulse output
2	Horizontal sync separation output	13	Vertical blanking width adjustment
3	Horizontal AFC input	14	Vertical drive output
4	Horizontal AFC output	15	Vertical feedback
5	Horizontal oscillation input	16	Vertical GND
6	Abnormal high voltage prevention input	17	Vertical oscillation (Discharge)
7	Abnormal high voltage prevention reference voltage	18	Vertical oscillation (Charging)
8	Abnormal high voltage prevention integration	19	Vertical sync input
9	Horizontal GND	20	Vertical sync separation output
10	Horizontal pre-drive	21	Vertical section power supply
11	Horizontal section power supply	22	Vertical sync separation input

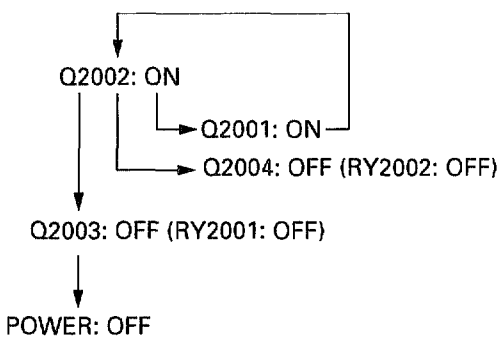
11. OUTLINE OF POWER OFF CIRCUIT DURING TROUBLE

This unit is mounted with various protection circuits. When these protection circuits function, the relay (RY2001) which serves as the power switch is turned OFF and the power of the unit goes OFF. Consequently, when the power goes OFF immediately after it is turned ON, it may mean that the protection circuits are functioning. When the protection circuits function, the thyristor composed of Q2001 and Q2202 will prevent the power from being turned ON when the power switch on the front control section is turned ON or when the power is turned ON using the remote control unit.
When checking the symptoms, disconnect the power line from the power connector for more than 15 to 20 seconds.

11.1 Types and Functions of Protection Circuit

1. Relay (RY2002) ON Detection Circuit

In this unit, the resistors (R2015, R2017) are inserted into the primary side of the switching regulator.
They function to control the surge current when the power is turned ON.
After the power is turned ON, it turns ON the relay (RY2002) and short-circuit the resistors (R2015, R2017). If this relay (RY2002) does not turn ON due to some reason, the resistors (R2015, R2017) will overheat, or the operations of the unit may become unstable.
The function of this circuit is to make sure that this relay (RY2002) turns ON properly.
If the relay does not turn ON, a potential difference occurs between the ends of the resistors (R2015, R2017).
This difference is detected by IC2001.
When the difference is detected, a plus voltage (12V) will be output to Pin 3 of IC20001.
This voltage becomes 4.7V when it passes through R2013 (TP2004), and is added to the Q2002 base after passing through R2004 and D2006 (the Q2002 base voltage becomes 0.6V to 0.7V according to the diode characteristics between the base and emitter). Q2002 turns ON as a result.
Hereafter, the power supplies turn OFF in the following order.



2. Detection Circuit for Unconnected E5 and D4 Connectors

When the power is turned ON with the E5 or D4 connector disconnected after repairs, the horizontal deflection circuit and horizontal deflection stop detection circuit will not operate, and the CRT will be burned horizontally.
This is prevented by this circuit.
The D2001 anode is pulled-up by the R2045 connected to 15V power supply. When the E5 or D4 connector is connected, the D2002 anode at the deflection assembly side becomes 0V, because it is connected to GND.
When E5 or D4 is not connected, the D2002 anode voltage becomes 1.6V, and turns ON Q2002 via D2002 and R2002.
Hereafter, the operations are the same as the relay (RY2001) ON detection circuit.

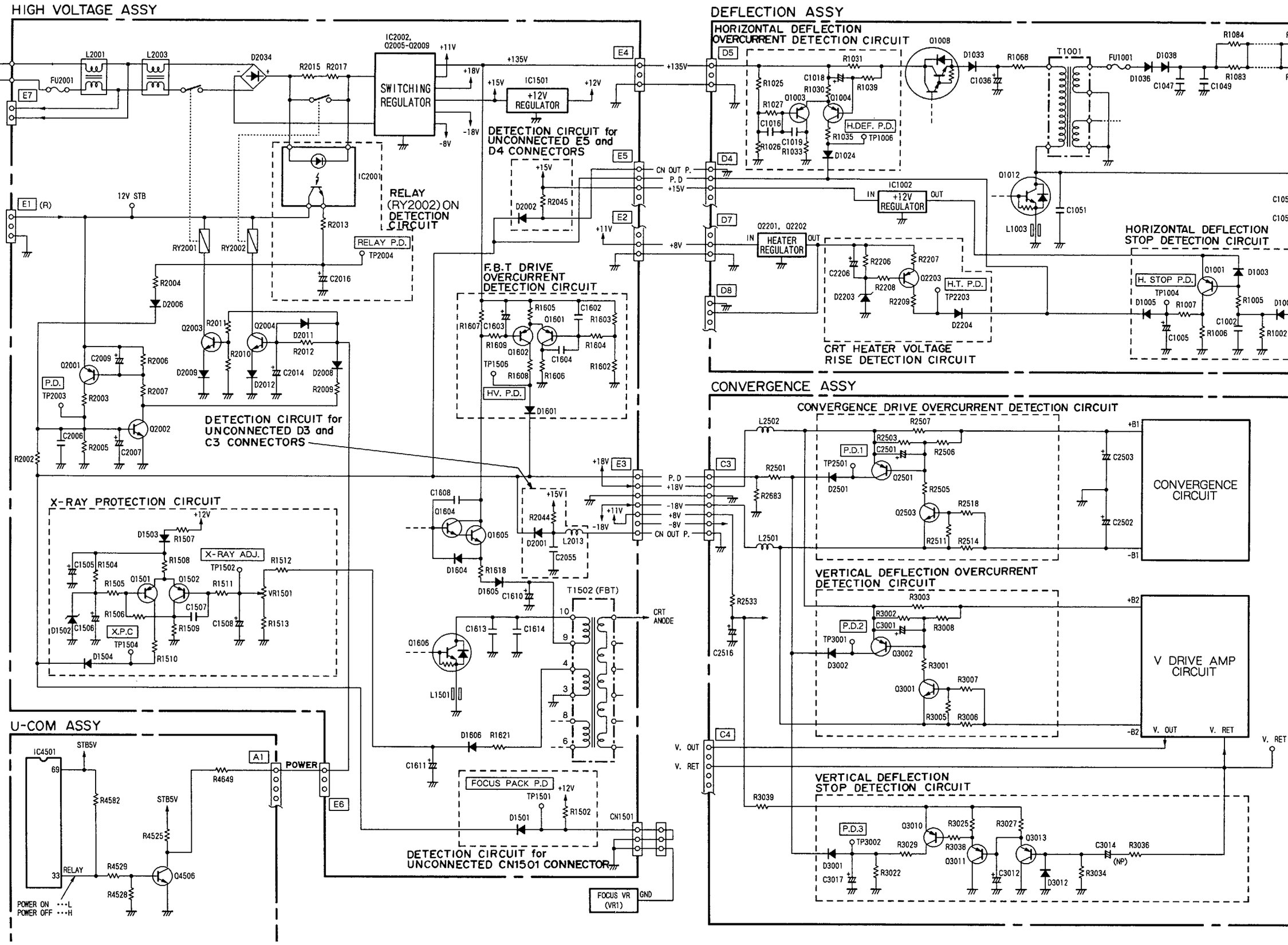
3. F.B.T. Drive Overcurrent Detection Circuit

This circuit prevents the switching regulator from malfunctioning due to overload when the F.B.T. drive current increases due to problems of the high voltage circuit and CRT drive circuit.
The potential difference between the two ends of R1607 due to the F.B.T. drive current is detected by Q1602. When this difference rises above approximately 1.4V, Q1602 turns ON, and generates a voltage above 22V at the collector.
This voltage becomes 1.4V to 2.5V when it passes through R1608 (TP1506), and turns ON Q2002 after passing through D1601 and R2002.
Hereafter, the operations are the same as the relay (RY2001) ON detection circuit.

4. X-Ray Protection Circuit

When the CRT anode voltage (normal value, 31.9 kV at the maximum) becomes higher than normal due to some reason, the CRT may radiate X-ray.
When the anode voltage becomes abnormally high, this is detected and the relay (RY2001) is turned OFF. This detection is carried out by monitoring the output voltage of an exclusive windings (Pins 3 and 4) connected to the F.B.T. (T1502) generating the anode voltage. When the anode voltage increases, the output voltage of this windings also increases, and the voltage changes are detected by the Q1501 and Q1502 differential amplifier.
When the TP1502 voltage rises above 5.1V, current is output to the base from the Q1501 emitter.
As a result, Q1501 turns ON, and generates a 1.7V to 5.1V voltage at the collector. This voltage becomes approximately 1.4V when it passes through R1510 (TP1504) and is added to the Q2002 base via D1504 and R2002. As a result, Q2002 turns ON.
Hereafter, the operations are the same as the relay (RY2001) ON detection circuit.
The operating points of this X-ray protection circuit are set to the appropriate values by VR1501 during the shipment of the high voltage assembly.

SD-V5070NE


HIGH VOLTAGE ASSY
DEFLECTION ASSY
CONVERGENCE ASSY
U-COM ASSY
T1
T2
FU2007
T6.3AH250V
ATT1277
BSM1010
AC IN
L2001
L2003
FU2001
D2034
R2015 R2017
IC2002, Q2005-Q2009
SWITCHING REGULATOR
+11V
+18V
-18V
-8V
+135V
IC1501
+12V REGULATOR
+12V
DETECTION CIRCUIT for UNCONNECTED E5 and D4 CONNECTORS
IC2001
RELAY (RY2002) ON DETECTION CIRCUIT
RELAY P.D.
TP2004
C2016
R2013
RY2001
RY2002
12V STB
R2004
D2006
Q2001
C2009
R2006
R2007
R2003
P.D.
TP2003
Q2003
Q2004
R201
R2010
D2011
R2012
D2009
D2012
C2014
D2008
R2009
DETECTION CIRCUIT for UNCONNECTED D3 and C3 CONNECTORS
Q2002
C2006
R2005
C2007
R2002
X-RAY PROTECTION CIRCUIT
D1503
R1507
R1508
X-RAY ADJ.
TP1502
R1512
C1505 R1504
R1505
Q1501
Q1502
R1511
VR1501
C1507
R1506
C1508
R1513
D1502
C1506
X.P.C
TP1504
R1509
D1504
R1510
F.B.T DRIVE OVERCURRENT DETECTION CIRCUIT
R1605
C1602
R1607 C1603
Q1601
R1603
R1609
Q1602
R1604
C1604
TP1506
R1608
R1606
R1602
HV. P.D.
D1601
C1608
Q1604
Q1605
R2044
D2001
L2013
C2055
D1604
R1618
D1605
C1610
T1502 (FBT)
CRT ANODE
Q1606
C1613
C1614
L1501
D1606 R1621
C1611
FOCUS PACK P.D
+12V
TP1501
R1502
D1501
CN1501
DETECTION CIRCUIT for UNCONNECTED CN1501 CONNECTOR
FOCUS VR (VR1)
GND
E1 (R)
E2
E3
E4
E5
E6
E7
D2002
R2045
CN OUT P.
P. D
+15V
+8V
-8V
HORIZONTAL DEFLECTION OVERCURRENT DETECTION CIRCUIT
D5
D4
D7
D8
D6
R1025
C1018
R1030
R1031
R1039
Q1008
D1033
R1068
T1001
FU1001
D1038
D1036
C1047
C1049
R1084
R1097
R1083
R1096
R1108
R1027
Q1003
Q1004
C1016
H.DEF. P.D.
R1035
TP1006
R1026
C1019
R1033
D1024
C1036
Q1012
C1051
L1003
TO DEFLECTION YOKE
C1053
C1052
R1101
IC1002
+12V REGULATOR
IN
OUT
Q2201, Q2202
HEATER REGULATOR
C2206
R2206
R2207
Q2203
R2208
R2209
H.T. P.D.
TP2203
D2203
D2204
CRT HEATER VOLTAGE RISE DETECTION CIRCUIT
HORIZONTAL DEFLECTION STOP DETECTION CIRCUIT
H. STOP P.D.
TP1004
Q1001
D1003
D1005
R1007
R1005
D1001
C1002
R1003
C1005
R1006
R1002
CONVERGENCE DRIVE OVERCURRENT DETECTION CIRCUIT
L2502
R2507
R2503
C2501
P.D.1
TP2501
D2501
Q2501
R2506
R2505
Q2503
R2518
R2511
R2514
+B1
-B1
C2503
C2502
CONVERGENCE CIRCUIT
R2501
R2683
L2501
R2533
C2516
VERTICAL DEFLECTION OVERCURRENT DETECTION CIRCUIT
R3003
R3002
C3001
P.D.2
TP3001
D3002
Q3002
R3008
R3001
Q3001
R3007
R3005
R3006
+B2
-B2
V DRIVE AMP CIRCUIT
V. OUT
V. RET
C3
C4
VERTICAL DEFLECTION STOP DETECTION CIRCUIT
R3039
P.D.3
TP3002
D3001
C3017
R3022
Q3010
R3029
R3025
R3038
Q3011
R3027
Q3013
C3012
D3012
C3014
(NP)
R3036
R3034
IC4501
STB5V
69
R4582
R4649
A1
POWER
E6
R4525
R4529
33
RELAY
Q4506
R4528
POWER ON ···L
POWER OFF ···H

5. Detection Circuit for Unconnected E3 and C3 Connectors

When the power is turned ON with the E3 or C3 connector disconnected after repairs, the vertical deflection circuit and vertical deflection stop detection circuit will not operate, and the CRT will be burned horizontally.
This is prevented by this circuit.
The D2001 anode is pulled-up by the R2044 connected to 15V power supply. When the E3 or C3 connector is connected, the D2001 anode at the deflection assembly side becomes 0V, because it is connected to GND.
When E3 or C3 is not connected, the D2001 anode voltage becomes 1.6V, and turns ON Q2002 via D2001 and R2002.
Hereafter, the operations are the same as the relay (RY2001) ON detection circuit.

6. Detection Circuit for Unconnected CN1501 Connector

When the power is turned ON with the CN1501 connector disconnected after repairs, the focus volume pack GND sets into the open state, and the focus voltage is transmitted to the GND wire via the focus volume pack.
If there are parts nearby, electricity is discharged from the GND wire, which may damage the circuit.
This is prevented by this circuit.
The D1501 anode is pulled-up by the R1502 connected to 12V power supply. When the CN1501 connector is connected, the anode becomes 0V as the connector pin at the focus volume side is connected to the GND pin.
When CN1501 is not connected, the D1501 anode voltage (TP1501) becomes 1.5V, and turns ON Q2002 via D1501 and R2002.
Hereafter, the operations are the same as the relay (RY2001) ON detection circuit.

7. Horizontal Deflection Overcurrent Detection Circuit

This circuit prevents the switching regulator from malfunctioning due to overload when the horizontal deflection current increases due to problems of the horizontal deflection circuit, etc.
The potential difference between the two ends of R1031 due to the horizontal deflection current is detected by Q1004. When this difference rises above approximately 2V, Q1004 turns ON, and generates a voltage above 22V at the collector.
This voltage becomes 1.4V to 2.5V when it passes through R1035 (TP1006), and turns ON Q2202 after passing through D1024 and R2002.
Hereafter, the operations are the same as the relay (RY2001) ON detection circuit.

8. Horizontal Deflection Stop Detection Circuit

When the horizontal deflection circuit stops working due to some reason, the CRT will be burned vertically.
To prevent this, the presence/absence of the horizontal deflection pulse is detected by Q1001. When the horizontal deflection pulse is present, the horizontal deflection pulse is converted to DC voltage by D1001 and C1002, and a reverse-bias is applied to Q1001. As a result, Q1001 turns OFF.
When the horizontal deflection stops and the horizontal deflection pulse stops, the reverse-bias voltage applied to Q1001 also stops and Q1001 turns ON.
As a result, a 12V voltage is generated at the collector.
This voltage becomes 2.2V when it passes through R1007 (TP1004), and turns ON Q2002 after passing through D1005 and R2002.
Hereafter, the operations are the same as the relay (RY2001) ON detection circuit.

9. CRT Heater Voltage Rise Detection Circuit

The CRT heater voltage is controlled by Q2001 and Q2202 so that it becomes 6.5V normally. When this heater power supply circuit breaks down and the voltage increases, the CRT life shortens.
This is prevented by this circuit.
As the Q2203 base voltage is locked at 7.2V by D2203, when the heater voltage rises above 8V, Q2203 turns ON, and generates a 6V voltage at the collector.
This voltage becomes 2.7V when it passes through R2209 (TP2203), and turns ON Q2002 after passing through D2204 and R2002.
Hereafter, the operations are the same as the relay (RY2001) ON detection circuit.

10. Convergence Drive Overcurrent Detection Circuit

This circuit prevents the R2507, R2514 (0.33 Ω, 1W), R2636, R2641, R2646 to R2649 (1.8 Ω, 2W) resistors from overheating when the convergence york drives IC2510 and IC2511 (STK392-020) malfunction and an abnormal current flows.
The potential difference between the two ends of the R2507 and R2514 resistors caused by the drive current of the convergence circuit is detected by Q2501 (for R2507) and Q2503 (for R2514).
When the potential difference between the ends of both R2507 and R2514 becomes approximately 0.73V, Q2501 and Q2503 turn ON.
When only Q2501 turns ON, a 17V voltage is generated at the collector (TP2501).
When only Q2503 turns ON, a –17V voltage is generated at the Q2503 collector. As a result, Q2501 turns ON, and the TP2501 voltage becomes the same as when only Q2501 turns ON. This TP2501 voltage turns ON Q2002 via D2501, R2501, and R2002.
Hereafter, the operations are the same as the relay (RY2001) ON detection circuit.

11. Vertical Deflection Overcurrent detection Circuit

This circuit prevents the R3003, R3006 (1 Ω, 1W), R3030, R3031, R3037 (1 Ω, 2W) resistors from overheating when the Q3014 and Q3015 transistors of the vertical output amplifier short-circuit, etc., and an abnormal current flows.
The potential difference between the two ends of the R3003 and R3006 resistors caused by the drive current of the vertical output amplifier is detected by Q3002 (for R3003) and Q3001 (for R3006).
When the potential difference between the ends of R3003 becomes approximately 1.1V, and that between the ends of R3006 becomes approximately 1.3V, Q3002 and Q3001 detecting the respective potential difference turn ON.
When only Q3002 turns ON, a 17V voltage is generated at the collector (TP3001). When only Q3001 turns ON, a –17V voltage is generated at the Q3001 collector. As a result, Q3002 turns ON, and the TP3001 voltage becomes the same as when only Q3002 turns ON. This TP3001 voltage is connected to the same line as the convergence drive overcurrent detection circuit after passing through D3002.
Hereafter, the operations are the same.

12. Vertical Deflection Stop Detection Circuit

When the vertical deflection circuit stops working due to some reason, the CRT will be burned horizontally.
This is prevented by this circuit.
When the V.RET voltage (voltage returning from vertical deflection york) is present, Q3013 sets to ON/OFF, and discharges C3012.
When there is no V.RET voltage, Q3013 sets to OFF, and as a result, the C3012 voltage rises, Q3011 turns ON, Q3010 also turns ON, and generates a 9V voltage at the collector. It becomes 6V when it passes through R3029 (TP3002).
After this TP3002 voltage passes through D3001, it is connected to the same line as the convergence drive overcurrent detection circuit.
Hereafter, the operations are the same.

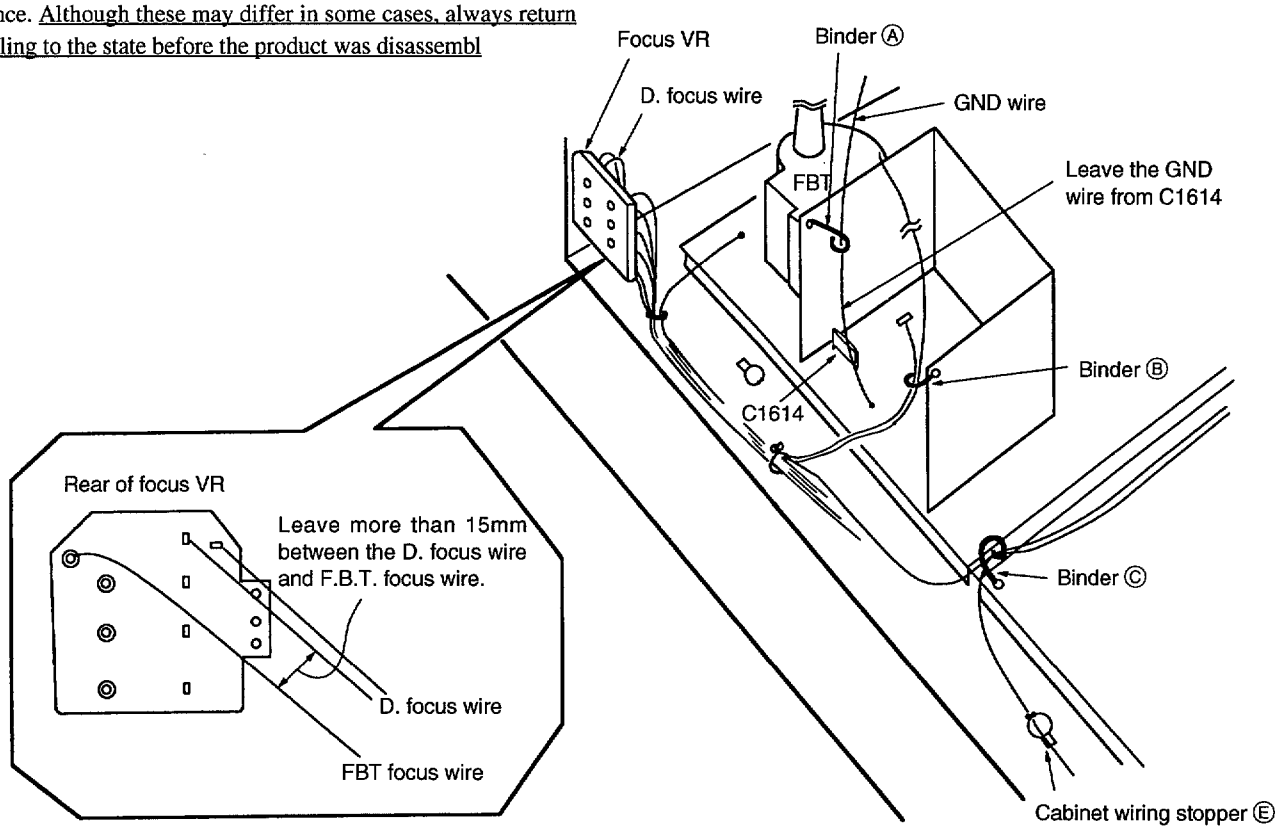
11.2 Diagnosing Problems During Power Down Operations

• Diagnosis method : Observe each TP during power down using the oscilloscope or tester, insert the AC plug into the outlet, and turn ON the power of the unit.
At the same time, find TPs which generate voltages above 1.4V directly before power down, and diagnose them according to the following table.

TP No.	TP Name	Faulty Assy	Cause
TP1501	FOCUS PACK P.D.	—	• CN1501 is disconnected.
TP1504	X. P. C.	HIGH VOLTAGE ASSY	• Short-circuit of high voltage control Tr (Q1604, Q1605)
TP1506	HV. P. D.		• Short-circuit of high voltage output Tr (Q1606) • Rare-short-circuit of F.B.T. (fly-back transformer) (T1502). • F.B.T. load short-circuit (T1502) • Short-circuit of CRT drive Tr (Q801, Q821, and Q841).
TP2004	RELAY P.D.		• RY2002 fault or contact point fault. • Q2004 is open.
—	D2001 Anode wire	—	• Connector E3 or C3 is disconnected.
—	D2001 Anode wire	—	• Connector E5 or D4 is disconnected.
TP1004	H. STOP P.D	DEFLECTION ASSY	• Horizontal output transistor (Q1012) is faulty. • Resistor is open (R1031, R1068, R1076)
TP1006	H. DEF. P.D		• Horizontal output transistor (Q1012) is faulty. • Horizontal pin modulation output transistor (Q1008) is faulty.
TP2203	H.T. P.D		• Heater regulator (Q2201, Q2202) is faulty, • Reference Zener diode (D2203) is faulty.
TP2501	P.D. 1	CONVERGENCE ASSY	• Waveform generation IC (IC2503, IC2504) is faulty. • Convergence amplifier (IC2510, IC2511) is faulty.
TP3001	P.D. 2		• Waveform generation IC (IC2503, IC2504) is faulty. • Vertical output amplifier (Q3014, Q3015) is faulty. • V.BLK signal is absent.
TP3002	P.D. 3		

12. WIRING

After disconnecting the wiring of this unit, return the styling of the wiring (drawing it around) back to its original position.
Figs. 12-1 and 12-2 show the important points in styling for reference. Although these may differ in some cases, always return the styling to the state before the product was disassembl



- Disconnect binders Ⓐ and Ⓑ from the heat sink, and adjust the D. focus wire so that is it slightly tightened.
- Bind the binder Ⓒ so that it is away from the board.

Fig. 12-1. Wiring (1)

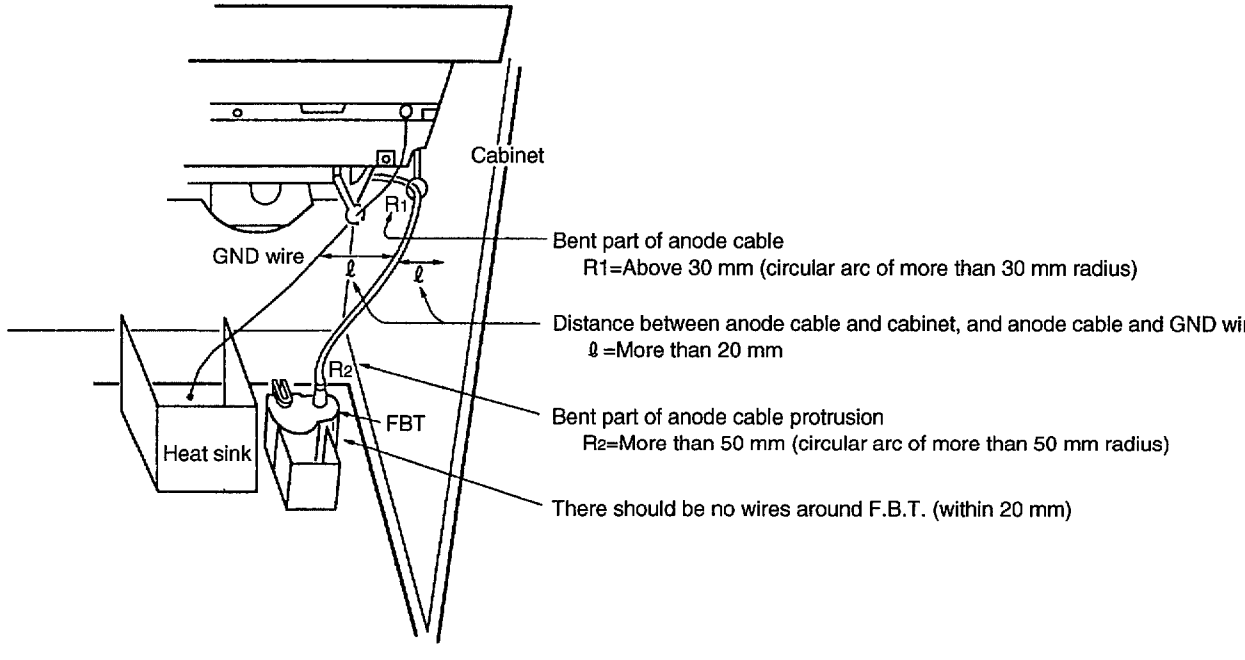
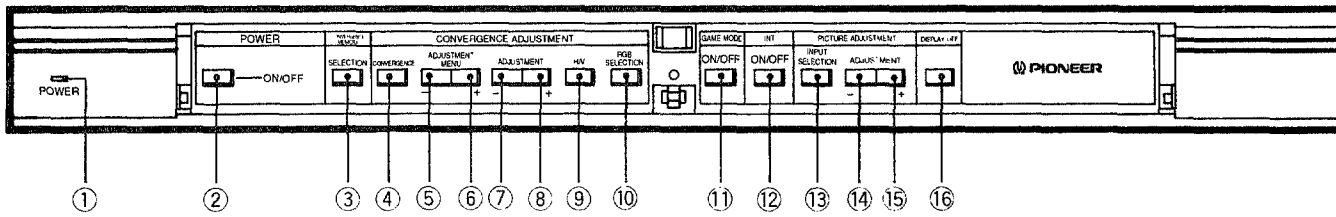

Cabinet
R1
GND wire
ℓ
ℓ
R2
FBT
Heat sink
Bent part of anode cable
R1=Above 30 mm (circular arc of more than 30 mm radius)
Distance between anode cable and cabinet, and anode cable and GND wire
ℓ =More than 20 mm
Bent part of anode cable protrusion
R2=More than 50 mm (circular arc of more than 50 mm radius)
There should be no wires around F.B.T. (within 20 mm)

Fig. 12-2. Wiring (2)

13. PANEL FACILITIES



① Power indicator

Lights up in green when the power is turned on.

② Power button

Turns ON/OFF the power.

③ Convergence Memory select button

This Monitor can preset convergence adjustment data in three ways.

This button is used to select the preset data.

→ STD
↓
CUSTOM 1 (User option 1)
↓
CUSTOM 2 (User option 2)

④ Convergence Adjustment button

Switches the convergence adjustment mode.

→ OFF
↓
Adjustment mode 1 (Cross-hatch on black screen (Lattice))
↓
Adjustment mode 2 (Input video screen)

⑤ Convergence Adjustment Menu button (–)

⑥ Convergence Adjustment Menu button (+)

Switches the convergence adjustment items.

The items change in the following order with the –button and in the reverse order with the +button.

When STD is selected using the convergence memory, these buttons will not function.

→ SUB PIN
↓
PIN
↓
SUB KEY
↓
KEY
↓
LIN
↓
SIZE (GH and GV are image size adjustment data)
↓
BOW
↓
SKEW
↓
STATIC (Excluding GH and GV)

⑦ Convergence Adjustment button (–)

Decreases the convergence adjustment [Variable range] data value.

GH, GV SIZE : –32 to +31

(Equivalent to SIZE data of video adjustment mode)

Others : –127 to +127

⑧ Convergence Adjustment button (+)

Increases the convergence adjustment data value.

⑨ Convergence Adjustment H/V button

Switches the horizontal (H)/vertical (V) mode of the color to be adjusted selected using ⑩ RGB select button.

When adjusting GREEN GH↔GV
(None when STATIC is selected.)
When adjusting RED RH↔RV
When adjusting BLUE BH↔BV
When all color mode RH→RV→GH
↑ ↓
BV←BH←GV

However, when STD is selected using the Convergence Memory button. the Adjustment Menu button will not function. In the all color mode, the mode including the adjustment menu is switched using the H/V button.

RH STATIC→RV STATIC
↑ ↓
BV STATIC GH SIZE (Video adjustment data)
↑ ↓
BH STATIC←GV SIZE (Video adjustment data)

⑩ Convergence Adjustment RGB select button

Switches the color mode to be adjusted in convergence adjustment.

	[CRT turned ON]
→ All color mode :	R. G. B (White)
↓	
GREEN adjustment mode :	G (Green)
↓	
RED adjustment mode :	G, R (Yellow)
↓	
BLUE adjustment mode :	G, B (Blue)

⑪ Game Mode ON/OFF button

Turns ON/OFF the CRT burning-reduction function.
GAME MODE ON↔GAME MODE OFF
The burning-reduction function moves the H POSI (horizontal position) and V POSI (vertical position) data at a certain interval to eliminate static images on the screen.

⑫ INT ON/OFF button

Effective only for the non-interlace video input.
When ON, it is converted to interlace and the following are improved.

- The scanning lines become inconspicuous
- The characters become clear
- Burning is reduced

INTERLACE ON↔INTERLACE OFF

⑬ Picture Quality Adjustment button

Selects the adjustment mode of the video data.
[After adjustment menu is displayed]

→ CONTR	contrast	(–32 to 31)
↓		
BRIGHT	brightness	(–32 to 31)
↓		
H POSI	horizontal position	(–32 to 31)
↓		
V POSI	vertical position	(–32 to 31)
↓		
H SIZE	horizontal size	(–32 to 31)
↓		
V SIZE	vertical size	(–32 to 31)
↓		
LEVEL	Input signal ATT level	(LOW/MID/HI)

⑭ Picture Quality Adjustment button (–)

Decreases the data value of items selected by the Picture Quality Select button ⑬
Data other than LEVEL decreases to –32.
The LEVEL data is set HI→MID→LOW

⑮ Picture Quality Adjustment button (+)

Increases the data value of items selected by the Picture Quality Adjustment button ⑬
Data other than LEVEL increases to 31.
The LEVEL data is set LOW→MID→HI

⑯ Display OFF button

Press when turning OFF the screen immediately which usually becomes blank 4 seconds after the corresponding button is pressed.

14. SPECIFICATIONS

■Power supply voltage ..... 220 to 230V ± 10%, 50/60Hz
■Power consumption ..... 210W (Standby : 3W)
■Input terminal
AC power supply input .... Specified connector-12 PINx1
Analog RGB signal input.... Specified connector-9 PINx1
■RGB input signal
Polarity ..... Positive
Signal level ..... 0.7 to 5.0 Vp-p
(Input sensitivity-3 levels switching)
LOW : 2.5 to 5.0 Vp-p
MID : 1.2 to 2.5 Vp-p
HI : 0.7 to 1.2 Vp-p
Input impedance ..... Fixed at 75 Ω
■Sync signal
Polarity ..... Negative
Signal level ..... Horizontal : 1 to 5Vp-p
Vertical : 1 to 5 Vp-p
Signal width ..... Horizontal : 3 to7µs
Vertical : 190 to 500µs
Input impedance ..... 4.3 kΩ
Convergence : ..... Digital-analog system
(Memory- : 3 modes)
[STD and CUSTOM 1, 2]

■Picture quality adjustment ..... Contrast, brightness
■Screen adjustment ..... Horizontal and vertical size, horizontal and vertical position
■Special functions ..... Game mode, interlace mode
■External dimensions
(WidthxHeightxDepth) ..... 114.6x133.65x61.6 cm
■Weight ..... Approx. 99 kg
■Screen size (WidthxHeight) ..... 101.7x76.4 cm
■CRTs ..... 90° deflected 7-inch CRTx3
■Packing external dimensions
(WidthxHeightxDepth) ..... 124.8x142.2x70.7 cm
■Packing weight specification ..... Approx. 108 kg
■Safety standards
..... IEC65 (A system in which this porduct and other devices are combined should satisfy the safety standard.)
■Assured operating ambient temperature ..... 0 to 35°C
■Storage ambient temperature ..... -20 to 60°C
■Ambient humidity ..... 20 to 80%